NELSON MANDELA UNIVERSITY

Determination of social, environmental and economic benefits for community participation in forestry in Mpumalanga, South Africa

By:

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DECLARATION:

In accordance with Rule G5.6.3, I hereby declare that the above-mentioned treatise/ dissertation/ thesis is my own work and that it has not previously been submitted for assessment to another University or for another qualification.

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DATE: 14/03/2019

ABSTRACT

Rural communities living adjacent to commercial forestry operations are often affected by numerous negative social issues such as poverty, unemployment, poor healthcare, and limited infrastructure, amongst others. In excess of 61% of forestry land managed by the state owned SAFCOL SOC Ltd is under land claim, as part of the Restitution of Land Rights Act (Act 22 of 1994). It is therefore necessary for forest companies to seek active means of engaging and partnering with these communities through a participatory forest management (PFM) approach. This study explored the sustainable (social, environmental and economic), benefits of such an approach as perceived (experienced) by these local rural communities, and specifically land claimants.

The study was conducted in communities adjacent to SAFCOL plantations in the Mpumalanga Province of South Africa. Data were collected between May and June 2017 by means of a structured questionnaire. Surveys were conducted on 46 households within the identified communities so as to verify and evaluate perceived benefits in terms of forest products, ecosystem services and amenities/services/infrastructure provided by SAFCOL and the broader forest industry.

The results indicated that these communities recognize and obtain numerous social, environmental and economic benefits from the forest including Non-Timber Forest Products (NTFPs) such as firewood; forest provisioning ecosystem services (FPESs) such as improved water quality; and more metaphysical benefits such as access to gravesites and the protection of traditions and customs. These benefits have the ability to improve the social well-being, economic independence, and the quality of environmental services obtained by the associated communities. It was however found that the utilization of these benefits was widely differentiated according to gender and land claimant status. Whilst males and females largely benefitted equally, there was a distinct benefit preference between genders for different NTFPs. For example males showed preference for the collection of building material, bush meat and for livestock husbandry, whilst females showed preference for the collection of firewood, medicinal plants and fruit, amongst others. Similarly, it was found that overall, non-land claimants benefited more than land claimants. Reasons for this are primarily due to the increased distance with which the land claimants live from the forest resource when compared to non-land claimants.

The empirical value of the data produced through this study will be invaluable in negotiations with the land claimant communities on land settlement agreements, joint venture proposals, including Participatory Forest Management, and future land tenure.

Through such inclusivity and vested interest in the sustainable management of the forests, corporate risk is reduced and community/land claimant relationships are reinforced. Such Participatory Forest Management arrangements are key to ensuring the longevity and resilience to the forest sector post-transfer of claimed land.

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DEDICATIONS

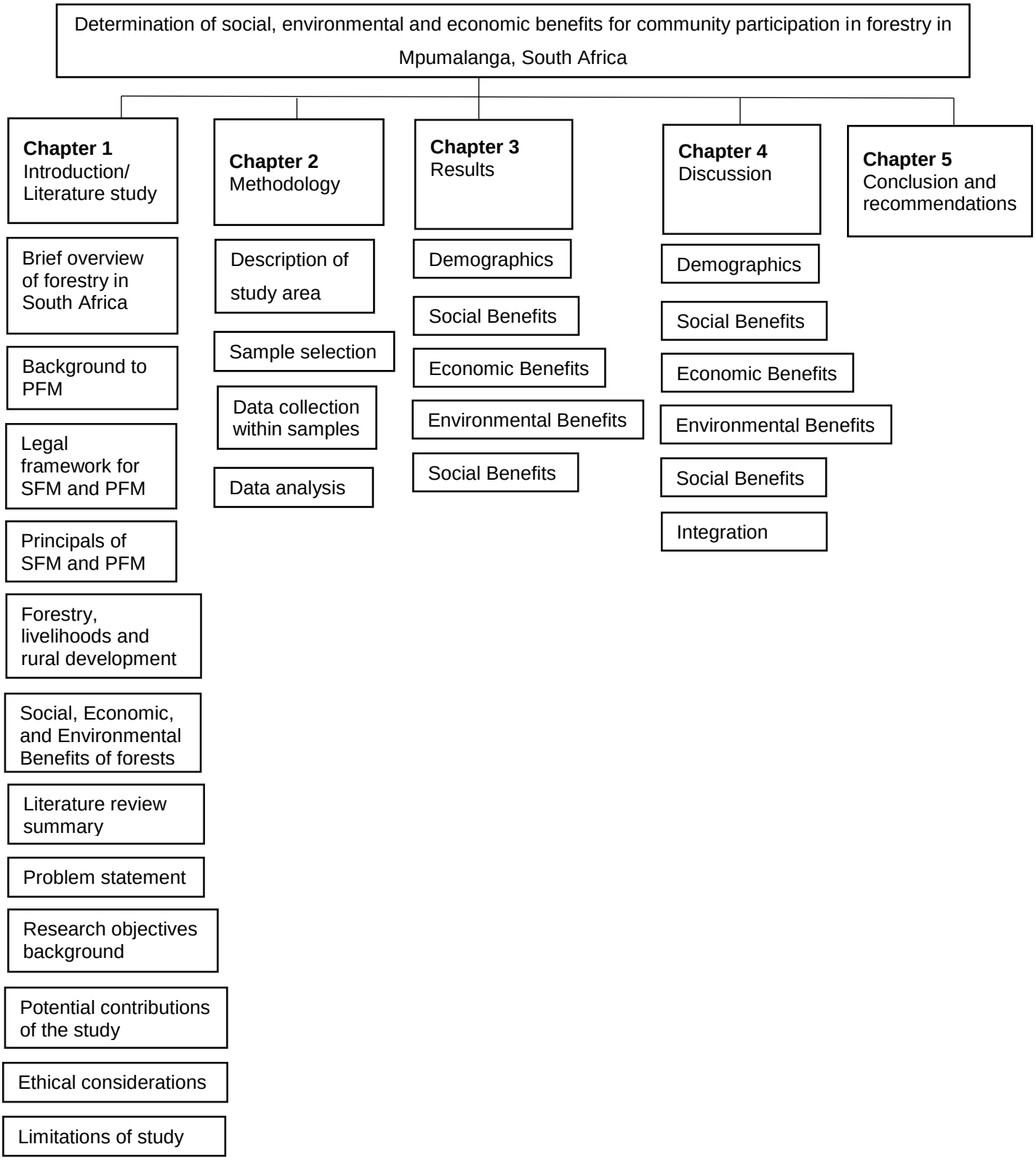
I would like to dedicate this study to my wife, Kerry, my son, Joshua, and my daughter, Rachel, who have stood faithfully by me during this lengthy endeavour, their love and support has made it worthwhile. Furthermore, to "*All who benefit from trees, but especially those whose livelihoods depend on them*" (Evans et al. 2004).

"*For the needy shall not always be forgotten: the expectation of the poor shall not perish for ever.*" (Psalms 9v18)

"*Whoso stoppeth his ears at the cry of the poor, he also shall cry himself, but shall not be heard*" (Proverbs 21v13)

"*Often the poor have poor rights too*" – Unknown

SYNOPSIS OF THESIS



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LIST OF ACRONYMS

BBBEE	Broad Based Black Economic Empowerment
CIFOR	Centre for International Forestry Research
CSI	Corporate Social Investment
DAFF	Department: Agriculture, Forestry and Fisheries
DWAF	Department of Water Affairs and Forestry
ED	Enterprise Development
ES	Ecosystem Services
FPES	Forests Provisioning Ecosystem Services
FSA	Forestry South Africa
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
IFPRI	International Food Policy Research Institute
ITTO	International Tropical Timber Organization
JCF	Joint Community Forum
MDG	Millennium Development Goals
NFA	National Forests Act
NTFP	Non-Timber Forest Products
NYDA	National Youth Development Agency
PCI	Principals, Criteria and Indicators
PEFC	Programme for the Endorsement of Forest Certification
PEN	Poverty Environmental Network
PFM	Participatory Forest Management
PRA	Participatory Rural Appraisal
RRA	Rapid Rural Appraisal
SAFCOL	South African Forestry Company Limited
SDG	Sustainable Development Goals
SED	Socio-Economic Development
SFI	Sustainable Forestry Initiative
SFM	Sustainable Forest Management
SOC	State Owned Company

UN	United Nations
UNCED	United Nations Conference on the Environment and Development
UNFAO	Food and Agriculture Organisation of the United Nations
USD	United Sates Dollars
UNWCED	United Nations World Commission on Environment and Development

Chapter 1: General Introduction and Overview of Participatory Forest Management

This chapter provides context for the study by exploring a brief history of forestry in South Africa, the legal frameworks that support the industry, especially Sustainable Forest Management (SFM) and Participatory Forest Management (PFM), and the principles thereof. The interface between rural communities, their development, products and Ecosystem Services (ES) provided by the forests are also examined.

1.1 Brief overview of forestry in South Africa

South Africa, with a total land area of 121 million ha (DWAF 2010), has commercially afforested areas in five of the eleven provinces, namely Eastern Cape (11.2%), KwaZulu-Natal (39.6%), Limpopo (3.8%), Mpumalanga (40.9%) and the Western Cape (4.4%) (DAFF 2016a). Whilst the national afforested area is small (ca. 1.2 million ha) relative to the global forestry area (ca. 290 million ha), the forest industry is closely aligned, and contributes to, the global commercial forest industry (PWC 1998, UNFAO 2014, UNFAO 2015a). This is further reinforced through the implementation of internationally recognized certification standards/bodies, such as Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC), amongst others.

Although the South African forestry sector contributes only 0.6% (ca. ZAR18.2 billion) to the Gross Domestic Product (GDP) (FP&M Seta 2014), in excess of 166 000 people are employed by the local forest industry, 93 000 directly employed in forest-based operations, and a further 73 000 in down-stream manufacturing and value adding facilities (DAFF 2015a). Furthermore, the sector is a net exporter of forest products to the value of ZAR12.2 billion per annum (DAFF 2009).

Commercial plantation forestry in South Africa was initiated at Genadendal in the Western Cape between 1825 and 1830 (Olivier 2010, Peng et al. 2014) with the primary role of reducing the over-exploitation of indigenous timber resources (Evans et al. 2004). Over the subsequent 140 years, the commercial forest industry has expanded from 408 hectares in 1889 (Britton 2006) to 1.2 million hectares in 2017 (FSA 2014, Godsmark 2017), or ca. 1% of the total land area (Godsmark 2017, Scott et al. 1998). Whilst this on-going expansion has reduced the over-exploitation of indigenous forests, specifically in the Western and Eastern Cape provinces, it is not sustainable due to the limited availability of land suitable for commercial tree production, which is further impacted by climatic restrictions and land tenure competition (Evans et al. 2004).

The global demand for industrial timber is projected to increase from 1.7 billion cubic meters per annum to between 2 and 3 billion by 2050 (Krishnaswamy and Hanson 1999). In order for the South African forest industry to remain competitive, meeting an increasing demand (Crickmay and Associates 2005), and maintaining productivity on a land-based diminishing at a rate of 0.9% per annum (DAFF 2011), there is a need for increased focus on SFM and the active involvement of all stakeholders.

1.2 Background to Participatory Forest Management (PFM)

The traditional view of plantation forestry has changed from the science of managing forested land for corporate economic gain to focus on the relationships between people and the resources provided by forests (DWAF 1996). This has been further strengthened through increased international emphasis on participation in forest management, also referred to as Participatory Forest Management (PFM) (Keeley and Scoones 2000). Underpinning PFM is the concept of Sustainable Forest Management (SFM), which is defined as, "*a dynamic and evolving concept, which aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations*" (Collaborative Partnership on Forests 2017). These social, economic, and environmental components of sustainability are also referred to as the Triple Bottom Line (Elkington 1998). The concept of SFM is extended by the 1989 Brundtland Report to include sustainable development "*that meets the needs of the current generation without compromising the ability of future generations to meet their needs*" (DWAF 1996, UNWCED 1987).

Sustainability in the forest industry is based on two fundamental components. The first is referred to as 'narrow sense' sustainability which deals with the long-term productivity of a planted stand of trees on a specific site over indefinite forest cycles. The second is referred to as 'broad sense' sustainability, which deals with the impacts of forestry activities that are benchmarked against economic, social and environmental standards (Evans et al. 2004). The achievement of broad sense sustainability is essential for transforming the forest sector to become representative of the national population, with the process managed through the implementation of internationally accepted certification standards.

To achieve SFM, a collaborative or participatory approach for forest management is advocated which encompasses a wide range of co-management practices, each with varying levels of community participation. Co-management practices include: Community-Based Natural Resource Management; Joint Forest Management; Community Forestry; and Participatory Forest Management (Anders 2000, BCCFA 2015, Jammeh 2008, Lawrence

and Green 2000). The common concept amongst these is the sharing of benefits between stakeholders, for example employment, forest provisioning ecosystem services (FPES) and non-timber forest products (NTFP).

Participatory Forest Management is defined by Geoghegan (2002) as "*a structured collaboration between governments, commercial and non-commercial users, interested organizations and community groups, and/or other stakeholders, to achieve shared objectives related to the sustainable use of forest resources*". According to FARM-Africa (2007), this definition includes the identification of forest management responsibilities, the clear parameters of rights for forest resource-use, as well as agreements on how forest benefits will be shared amongst stakeholders (for example land claimants, corporate companies, government departments, et cetera.). In contrast, Everton and Underwood (2004) emphasise increased involvement through the access to, and utilisation of forest resources through structured partnerships between state forest agencies and local communities.

Participatory Forest Management is distinguished from conventional forest management (**Table 1.1**) as being focused on benefit-sharing amongst stakeholders as opposed to production and profit driven practices inherent in conventional forest management.

Table 1.1: Differentiation between conventional forest management and sustainable participatory community-based forest management.

Sustainable Forest Areas	Conventional	Sustainable Forest Management
Economic	Profit maximization	Optimization of all success dimensions
	Focus on timber production	Multiple products (timber, NTFPs)
	Focus on international markets	Focus on local > regional > international markets
	Low value commodity timbers	High value specialty timbers
Social	Replacement of traditional land use models	Inclusion of traditional land use models
	Competitive	Cooperative
	Buying land	Leasing land
	Hiring work labour	Benefit sharing
Environmental	Monocultures (even aged)	Mixed forest plantation (diverse species and age)
	Focus on few foreign tree species	Focus on marketable native tree species
	Genetically improved species	Locally adapted species
	Extensive use of pesticides	Avoidance of pesticides
	Use of mineral fertilizers	Use of organic fertilizers
	Little conservation area	High percentage of conservation area
Technological	Standardized management	Demand oriented management
	Mechanisation	Biological rationalization
	Low complexity	High complexity

Source: https://openforests.com/

The three core components of sustainability (social, environmental, and economic factors) are thus central to the concept of SFM and are included at all levels of forest management.

1.3 Legal framework for Sustainable Forest Management and Participatory Forest Management

The need for a SFM approach is recognised internationally (Bowler et al. 2010), and following the United Nations Conference on the Environment and Development (UNCED) in 1992, 178 countries, including South Africa, adopted the Principles of Forest Management which would guide forest management into the future (UNFAO 2003b). In South Africa, this culminated in the 1996 adoption of the White Paper on Sustainable Forest Development (Bethlehem 2002, DAFF 2009). From this a series of legislative policies were developed for the forestry sector including the: National Forests Act, 1998 (Act No 84 of 1998); National Veld and Forest Fire Act, 1998 (Act No 101 of 1998); National Forest and Fire Amendment

Act, 2001 (Act No 12 of 2001); and Forest Laws Amendment Act, 2005 (Act No 35 of 2005) (DAFF 2009).

This SFM approach is further endorsed internationally by the 2015 adoption of the 17 United Nations (UN) Sustainable Development Goals (SDGs), specifically Goal 15 which aims to "*Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss"* (IFPRI 2015). Hogarth (2014) further emphasised the importance of the role of forest resources in reaching targets set out in the 8 UN Millennium Development Goals (MDG) adopted in 2000. Whilst forests are only considered as an indicator for Goal 7, they directly or indirectly contribute to most of the MDGs (UNFAO 2014).

Sustainability in the forest industry is comprised of two fundamental concepts. 'Narrow sense' sustainability, deals with the long-term productivity of a planted stand of trees on a specific site over indefinite forest cycles, whereas 'broad sense' sustainability, deals with the impacts of forestry activities that are benchmarked against economic, social and environment standards (Evans et al. 2004).

Traditionally, conventional management of commercial plantation forests focussed on maximising production and profit (being narrow sense sustainability). From the late 1980's there was a shift towards the adoption of a management approach that incorporated the principals of 'broad sense' sustainability (DWAF 1996).

This SFM approach is further supported through legislation, such as the principles of the National Forests Act, as highlighted in Section 3 (3):

(c) forests must be developed and managed so as to:

(ii) sustain the potential yield of their economic, social and environmental benefits (Scotcher and Everard 2001).

Furthermore, concerns raised in both the White Paper for Sustainable Forestry Development and the National Forest Act (NFA) prompted the development of a PFM strategy and principals for PFM in state forests, which are largely people-centred, participatory and should result in the equitable allocation of derived benefits (Watts 2003).

During the 2002 Second International Workshop on Participatory Forestry in Africa hosted by the UNFAO in Arusha, the United Republic of Tanzania, it was acknowledged that forest management trends globally are increasingly focused on participatory approaches (Geoghegan 2002, UNFAO 2001, Vyamana et al. 2009). These participatory approaches provide for the dissemination of the aforementioned benefits whilst devolving the management powers of state-owned forests from government to local communities, and

specifically land claimants, thereby improving forest management, instituting ownership and rights (Chirwa et al. 2017, Himberg et al. 2009, Lundy 1999, Robertson and Lawes 2005). Damte and Koch (2011) proposed that the transfer of power to community-based management scenarios of natural resource management as the most viable option for the sustainability of those resources from both an ecological and economic perspective.

This practise of devolving forest management rights to local communities has occurred in many developing countries, such as Tanzania (Bowler et al. 2010, Damte and Koch 2011), and has subsequently become the main strategy for forest management in some countries (for example the Gambia) (Jammeh 2008). Although there has been increased involvement of rural communities in forestry globally (Chirwa et al. 2017), decision making often still resides with corporates or state departments.

The concept of participatory or collaborative forest management encompasses a wide range of co-management arrangements, with varying levels of community inclusion, and a common theme of 'benefit sharing' between stakeholders.

Participatory Forest Management (PFM) specifically, can be defined as:

> *"an arrangement where key stakeholders enter into mutually enforceable agreements that define their respective roles, responsibilities, benefits, and authority in the management of defined forest resources"* (Matikua et al. 2013).

This definition is extended by Everton and Underwood (2004) to emphasise the access to, and utilisation of, forest resources through structured partnerships between state forest agencies and local communities.

The objective of entering into a PFM approach to commercial forest management is to protect the rights of local communities to access benefits from the natural resources of the country, whilst improving their livelihoods and contribution to local economic development (DWAF 2004a). UNFAO (2010) states that such "*processes that promote social inclusion and a sense of ownership contribute to sustainable forest management and should be incorporated into public policies.*"

Since the 1960s, participation by all stakeholders has become an important aspect in forest policy formulation (Holmes 2007), with some African countries revising their national legislation, policies, procedures and management plans to incorporate and promote stakeholder participation in management and decision-making (Geoghegan 2002). Examples of this include: Senegal in 1995 (Decleire 2002); the Gambia in 1998 (Jammeh 2008); Tanzania in 2002 (Ministry of Natural Resources and Tourism 2006); and Kenya in

2007 (Guthiga 2008). UNFAO (2015b) indicates that international attention on SFM has continues to increase, resulting in the legal framework for SFM being adopted globally.

Whilst SFM is not specifically referred to in the South African NFA of 1998, the act does provide for a collaborative approach, for example:

> *(a) promote the sustainable management and development of forests for the benefit of all; and*
>
> *(b) create the conditions necessary to restructure forestry in State forests.*

The Forest Sector Transformation Charter, which is endorsed by the Broad-based Black Economic Empowerment (BBBEE) Act (Act 53 of 2003), also promotes the restructuring of state forests to support black ownership, as noted in the following excerpts:

> *(a) The restructuring of state forest assets to support black ownership in the forestry subsector and, through log supply, in the forest product sectors; and*
>
> *(b) Achieving sustainable change in the racial and gender composition of ownership, management and control structures and in the skilled positions of existing and new forest enterprises.*

This legislative intervention was required to rectify the injustices of the apartheid administration, which included the forced relocation of forest dependent communities, and the deliberate discrimination in terms of access to forest resources (Holmes 2007).

South African Forestry Company Limited (SAFCOL) is a State Owned Company (SOC), established in terms of the Management of State Forests Act of 1992 (DWAF 1996), and is thus subjected to legislation that incorporates the principles underlying BBBEE. Of the land managed by SAFCOL, ca. 61% is under land claim (SAFCOL 2009), and is targeted for transformation and inclusiveness within the forest sector. The DWAF *Participatory Forest Management Policy and Practice in South Africa* document explains how the management of state forests would include partnerships with local communities. This document proceeds to set forth the role of government as being to "*promote equitable access to the opportunities and benefits arising from industrial forestry*". Berkes et al. (1991) concur that many solutions to the management of natural resources are secured through such state-community-based regimes.

This transformation process is advanced by an improved understanding of the potential benefits associated with sustainable forest management practices to be realised by land claimant communities, through a PFM approach. Globally, state-owned forests provide a higher average forest income per hectare (including NTFP and ecosystem services) when compared to privately owned and community-owned forests (PEN 2017).

As forest management cannot exclude the needs of the communities living adjacent to the forests (DWAF 2005b), the notion of a participatory approach to forest management has been actively promoted internationally through legislation policies and structures, including the 2002 World Summit for Sustainable Development which highlighted the need for the integration of local communities (Himberg et al. 2009). The Four Global Objectives on Forests, set out in the Forest Instrument, as adopted by the UN Economic and Social Council in 2007 (UNFAO 2014) also support this concept, for example objective two is stated as:

> *Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people.*

Finally, a number of regional inter-governmental structures have been developed over time, which promote a SFM and PFM approach. These include;

- the Southern African Development Community (SADC) Forestry Protocol, three primary objectives for forestry, being:
  - *To promote the development, conservation and sustainable management and utilization of all types of forests and trees;*
  - *To promote trade in forest products throughout the region in order to alleviate poverty and generate economic opportunities for the peoples of the Region; and,*
  - *To achieve effective protection of the environment, and safeguard the interests of both present and future generations (*Temu 2013*).*
- the African Forestry and Wildlife Commission, established in 1959 by the UNFAO, which aims to *provide a policy and technical forum for countries to discuss and address forest issues on a regional basis.*
- African Network for Agriculture, Agroforestry and Natural Resources Education, established in 1993, with the purpose of *working on education and capacity development to rebuild Africa's capacity in forestry.*
- the African Forest Forum, established in 2007, which functions include *handling policy, climate change, international negotiations, et cetera. (*Temu 2013*)*.

1.4 Principles of Sustainable Forest Management and Participatory Forest Management

Although Sustainable Forest Management (SFM), as defined in terms of both 'narrow and broad sense', remains the ultimate goal, Evans et al. (2004) explains that it is still an evolving concept with roots in the environmental, social, and cultural objectives and the expectations

which communities have of the forest resource. UNFAO (2010) expands this concept to include job security, the sustainable production of goods and services whilst improving the quality of life of rural people. It is further argued that SFM can, and will, only be achieved if the needs of these communities, especially land claimants, are considered and competition for forest resources addressed adequately (Desloges and Gauthier 1997 as cited in Evans et al. 2004).

In acknowledging that such affected communities are key stakeholders in forest management (Tesfaye 2011), with the need to incorporate their aspirations, the UNCED (1992) further proposed "*an integrated approach to planning and management of land resources involving environmental, social, and economic issues and the active participation of local communities*" (Evans et al. 2004). It is further recognised that the participation of communities at the planning stage results in better acceptance of forest projects (ibid). The World Rainforest Movement (2003) supports this by stating that community-based forest management has, from both a social and environmental perspective, proven to be more sustainable than the industrial alternative.

To achieve SFM, comprehensive guidelines have been developed globally by various institutions, organisations and structures, both governmental and private. ITTO (2016) explains that the SFM structure reflects a holistic approach to forests as a landscape component providing multiple benefits.

These 'guidelines' are often referred to as *PCIs* (Principles, Criteria and Indicators), and are used in forest certification to establish proof of SFM (UNFAO 2010a). The three elements of PCIs are clearly differentiated in the definition provided by CIFOR (1996):

- *Principle: a "fundamental truth or law as the basis of reasoning or action"; principles justify the chosen criteria, indicators and verifiers.*
- *Criterion: a "standard that a thing is judged by"; criteria enhance the meaning and operability of principles, but do not measure performance.*
- *Indicator: "any variable or component of the forest ecosystem or management system used to infer the status of a particular criterion"; indicators describe specific information around a criterion, and can be measured by verifiers.*

A number of organisations have developed and implemented PCIs for SFM assessment and certification internationally, with a brief overview of their PCIs in terms of social interests (communities) and PFM listed:

- International Tropical Timber Organization (ITTO) PCIs were first published in 1992 and consist of seven Criterion and 61 Indicators. Criterion 7 "*Economic, social and cultural*

aspects" provides a comprehensive framework for assessing the social impact of forestry including the equitable sharing of the benefits of forest management, as well as PFM through indicator 7.11 which states:

  - *Involvement of indigenous peoples and local communities in forest management* (ITTO 2016).

- Forest Stewardship Council (FSC) was established in 1993, stemming from the 1992 UNCED in Rio de Janeiro, with their PCIs first published in November 1994 and consisting of 10 Principles and 70 Criteria. Principle 4 "*The Organization shall contribute to maintaining or enhancing the social and economic wellbeing of local communities*" consists of eight indicators which explore community engagement and relationships including training, compensation and the recognition of traditional rites. PFM is referred to indirectly, under Principle 3 "*Indigenous Peoples' Rights*", specifically criteria 3.2 which states:
  - *The Organization shall recognize and uphold the legal and customary rights of Indigenous Peoples to maintain control over management activities within or related to the Management Unit to the extent necessary to protect their rights, resources and lands and territories. Delegation by Indigenous Peoples of control over management activities to third parties requires Free, Prior and Informed Consent* (FSC 2015).
- Programme for the Endorsement of Forest Certification (PEFC) was established in 1999, and contains seven Criteria, 66 Indicators, with a strong reference to sustainability throughout the document. Although there is no specific mention of PFM criterion 5 "*Maintenance of other socio-economic functions and conditions*" contains 14 indicators focusing on community respect and recognition, including local consultation on SFM, use of local forest knowledge, implementation of training, and respect of culturally significant sites (PEFC 2010).
- Sustainable Forestry Initiative (SFI) was established in 1994 and consists of 14 Principles, 20 criteria (called *objectives*), and 115 indicators. Whilst PFM is not mentioned explicitly, Principle 12 "*Public Involvement*", criteria/objective 17 "*Community Involvement in the Practice of Sustainable Forestry*" and criteria/objective 18 "*Public Land Management Responsibilities*" require consultation with, and involvement of, local community stakeholders. Commitment is made to protect the rights of indigenous people to access NTFPs and "*spiritually, historically, or culturally important sites*" (SFI 2010).
- Department of Agriculture, Forestry and Fisheries (DAFF) PCIs were first implemented in 2005, and consist of 24 principles, 24 criteria and 58 indicators (called *measures*). Community engagement and involvement in forest operations features prominently throughout the document, such as in the following criteria;

- *criterion 9: people have rights to access and use forests;*
- *indicator 9.4: cultural, ecological, recreational, historical, aesthetic and spiritual sites and services are maintained;*
- *criterion 11: land tenure of forest areas is clearly defined, recognised and secure; and*
- *criterion 12: cultural, ecological, recreational, historical, aesthetic and spiritual sites and services are maintained.*

PFM is also included within the following two criteria:

- *criterion 17: there is effective stakeholder participation in forestry management; and*
- *criterion 23: forest management planning promotes sustainable use and development of forest resources* (NDA 2015).

Most of these certification bodies were established in response to concerns raised during the 1992 UNCED in Rio de Janeiro, Brazil (FSC 2015, PEFC 2010, ITTO 2016), specifically with the adoption of Agenda 21 and the Statement of Forest Principles (Forestry Commission 2002). DAFF, being responsible for the promotion of the sustainable management of the forest resources for the benefit of South Africa (DAFF 2009), developed PCIs with an in-depth focus on communities and their interests. With 82% of all South African plantation estates certified by FSC, this represents the highest percentage of certified plantations per country in the world (DAFF 2009).

For the effective implementation of PFM, principles proposed by DAFF (Holmes 2007) include the need to:

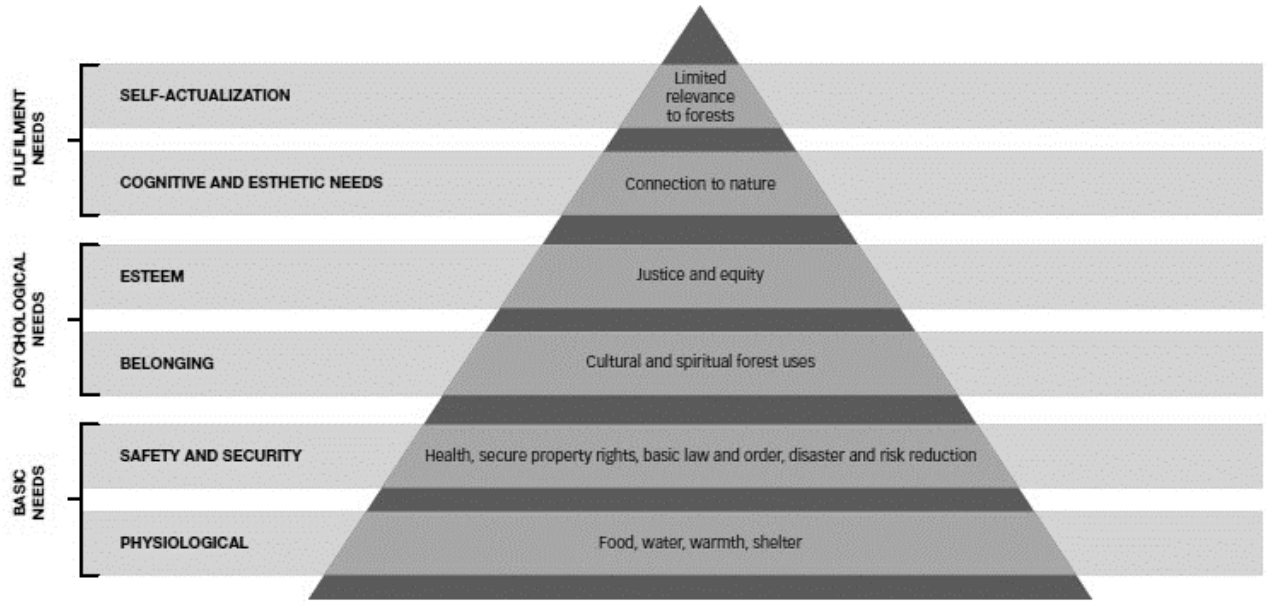
- *be people centred, with sustainable forest management being congruent with people's livelihood strategies, which will be supported and developed by PFM;*
- *be participatory and holistic;*
- *be economically, socially, politically and environmentally sustainable;*
- *be transparent and honest, and implemented with a common vision among stakeholders;*
- *be equitable;*
- *strive to ensure tangible short and long-term benefits to stakeholders;*
- *ensure that mechanisms for conflict resolution are in place;*
- *promote local empowerment by building capacity and utilizing appropriate indigenous knowledge;*
- *be located within the current policy and legislative framework whilst acknowledging cultural and traditional authority; and*

- *adopt a dynamic approach, maintaining a pattern of continuous consultation and feedback amongst stakeholders.*

1.5 Forestry, livelihoods and rural development

Planted forests and woodlands are recognized as forming an integral part of rural development (Evans et al. 2004), having a direct and measurable impact on the lives of rural people (UNFAO 2014). Evans et al. (2004) further state that minor inputs, such as the establishment of a woodlot within an area devoid of tree cover, can contribute to improved rural living standards. In 1997, the World Commission on Forests and Sustainable Development reported that 350 million people worldwide depended largely on forests for subsistence purposes. In 2002, the forest-dependent rural population was estimated to be much higher at 1.6 billion (World Bank 2002), and in 2012 the figure was suggested to be 20% of the global population (Chao 2012). Regardless of the difficulties associated with the estimates due to a lack of reliable global data sources (University of Reading 2000), the number of forest dependent people remains substantial. Byron and Arnold (1997) conclude that utilising the number of forest-dependent people is not particularly useful for measuring benefits derived from the forest due to the range and differing utilisation patterns of forest products and services globally. They rather suggest the use of disaggregated information, such as the types of uses and their related benefits, as this allows for sustainable yield determination and monitoring. The utilisation and importance of such forest products and services to the local communities is central to this study.

Whilst a wide range of benefits in the form of forest products and services are provided through the direct and indirect use of the forest resource (Acheampong 2003, Buttoud 2000), there is increasing pressure placed on these resources to satisfy the needs of ever increasing populations and the rising aspirations of people (Evans et al. 2004). The below adaption of *the hierarchy of needs*, Maslow (1943), proposes that forests should be managed to satisfy multiple basic human needs including access to food, water, shelter, healthcare, disaster and risk reduction, et cetera. (**Figure 1.1**).



Sources: Adapted from Maslow (1943).

Figure 1.1: The adaption of Maslow's 1943 hierarchy of basic human needs as relating to SFM (UNFAO 2014).

A study by the International Fund for Agricultural Development (IFAD) found that 1.1 to 1.3 billion people, mostly from developing countries (UNFAO 2016), are dependent on utilising forest outputs (including food and fuel) to meet their basic needs (UNFAO 2014). There is an assumption that plantation development automatically produces benefits for the rural population. However, Evans et al. (2004) argue that securing these benefits can be complex given the difficulty in quantifying the entire impact of plantation development on local communities and their individual livelihoods.

A livelihood is defined as:

the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term

(Chambers and Conway 1992, Scoones 1998)

The United Nations World Commission on Environment and Development (UNWCED) (1987) further defines a livelihood as the existence of adequate stocks and flows of food and cash to meet basic needs. Acheampong (2003) however, argues that the forest resource "*forms such a dominant part of their physical, material, economic and spiritual lives that its importance goes beyond the mere description of individual products or services that the forest provides*".

An inclusive SFM approach should be implemented, the theory of which is based on the integration of land and forest resource utilisation for the sustainable production of goods and services, whilst improving the rural livelihoods of communities (UNFAO 2010). Due to varying degrees of dependence and use of the forest resources by local communities, any benefits derived may also vary (UNFAO 2016). In 2007, the General Assembly of the United Nations adopted the Non-Legally Binding Instrument on All Types of Forests which incorporates SFM and the restoration of degraded forest resources. Of particular importance to this study is Goal objective two (2) which aims to "*Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people*" (UN 2007).

Forestry, as a rural-based industry, has a natural link with the local/rural disadvantaged populations, with a focus on the relationships between the people and the benefits provided by forest resources (DWAF 1996). Yemiru et al. (2010) indicate that dependency on forest income is generally higher in asset-poor households, where assets include aspects such as social networks, human capital and physical resources (Cocks 2006, World Bank 2001 as cited in Tesfaye 2011). Woodcock (1995) concurs that forest products often act as socio-economic buffers to the rural poor, since wealthier households are able to utilise alternatives to forest products.

Chambers and Leach (1990) state that a lack of clarity around the rights to access trees and harvesting them, often results in confusion and becomes a major disincentive in the development of rural forestry programmes. Agenda 21, as adopted during the 1992 UNCED in Rio de Janerio, Brazil, however promotes the participation of the broader public in decision making as being fundamental for achieving sustainable development (DAFF 2009). Angelsen et al. (2011) conclude that the role of forests is "*too important to be ignored if one wants to understand rural livelihoods and poverty*".

1.6 Social, economic and environmental benefits of forests

Forests, especially commercial and exotic planted forests, are often perceived as a biological crop, intensively managed for maximum production and return on investment for shareholders, with little focus on the potential for social and environmental beneficiation (Hinze 2004). Damte and Koch (2011) argue that empirical evidence exists of the significance and benefits of forests, forest products and related ecosystem services for the upliftment of rural livelihoods, especially in developing countries. This is supported by UNFAO (2010) which states that "*the forest is the source of a variety of products and*

services including wood and non-wood products and services as well as social, economic and cultural opportunities".

Since the late 1980's, the forest industry has experienced a paradigm shift towards the incorporation of the principals of 'broad sense' sustainability and the potential benefits to be realised by communities concerned (DWAF 1996). Besides the obvious economic benefits for the forest companies and those employed directly, there are numerous other forest products and ecosystem services provided by the forest resource which are unrecorded and/or underutilised.

Goods and services obtained from forest resources can be classified into three broad categories, namely, direct-use benefits, indirect-use benefits and intermediate-use services (Shackleton et al. 2002, Shackleton and Shackleton 2004b). Direct-use benefits include timber for construction and furniture, wood for crafts and household tools, fire wood, construction poles, wild fruits, wild vegetables, wild herbs, honey, bush meat, insects for food, bird eggs, medicinal products, thatch, grass hand-brushes, twig hand-brushes, weaving reeds, sand/clay, plant dyes, plant resins, seeds for rattles and decoration, amongst others. Indirect-use benefits include pollination services, livestock grazing, recreation/aesthetic services (eco-tourism), and religious functions, amongst others. Intermediate-use services comprise carbon sequestration, water shed protection, protection against soil erosion, habitat for wild fauna and flora (breeding and nursery functions), biodiversity reserve, oxygen production, acid rain deposition, roles in the water cycle, and runoff reduction, amongst others (Dlamini and Geldenhuys 2011).

Forest products and their importance to rural livelihoods have historically received little attention, and were labelled by the International Institute for Environment and Development (IIED) (1995) as the 'hidden harvest' (Shackleton 2005). Sometimes termed 'minor' forest products, due to their perceived low economic value and importance when compared to the timber production of the forest resource, the trade of these products however amounted to an annual gross value of United States Dollars (USD)88 billion in 2016 (World Bank 2016). Furthermore, Ros-Tonen and Wiersum (2005) suggest that for the many forest-dwelling people still depending largely on NTFPs for subsistence, the utilisation and sale of forest products may be one of the few opportunities they have of earning an income.

Benefits obtained from the forest resource (being forest products and ESs) are broadly grouped into Social, Environmental and Economic aspects. To understand the potential benefits of a PFM approach to sustainable forest management, it is necessary that each of these categories be further explored (which is the focus of this study).

1.6.1 Social benefits

Evans et al. (2004) states that "*social factors need to be treated just as seriously as technical and economic factors as they can have a major impact on the scale of a plantation development and on its long-term sustainability*".

In South Africa, commercial forestry is largely conducted in rural areas characterised by social issues, such as high levels of poverty, illiteracy, unemployment, poor infrastructure, low socio-economic growth, and high mortality rates, amongst others. Data on the social status quo of sub-Saharan Africa (**Appendix D**), within which this study area falls, indicates that this is the only area with negative growth in income per capita over the 20-year review period (1980 to 2000), as well as the highest infant mortality rate (Sachs 2004).

A 2015 report on global achievements against the UN MDGs lists some of the major social issues in sub-Saharan Africa as:

- *More than 40% of the population in sub-Saharan Africa still lives in poverty in 2015.*
- *The majority of people living on less than ZAR19.43 a day (being USD1.25 as at 26/05/2016 at 22:23) reside in Southern Asia and sub-Saharan Africa and they account for ca. 80% of the global total of poor people.*
- *Not only do half the world's under-five deaths occur in sub-Saharan Africa (3 million in 2015), but it is also the only region where both the number of live births and the under-five population are expected to rise over the next decades.*
- *Sub-Saharan Africa remains the region most affected by the HIV epidemic, with 1.5 million new infections in 2013. Of these, almost half occurred in only three countries: Nigeria, South Africa and Uganda. South Africa is the country with the largest number of people living with HIV* (UN 2015a).

Whilst these negative statistics provide a background to the need for social intervention and benefits in the study area, the forest industry globally continues to have positive impacts on the social well-being of the rural communities who depend on them.

In South Africa, forest resources supply the basic needs for many people (the exact number is not known), through fuelwood, medicinal plants, edible fruits and building materials, amongst others (DWAF 2005a). Fuelwood specifically is utilised by 14.7% of the population as a primary source of energy, with dependency predicted to increase over the next few decades (UNFAO 2014). A 2014 assessment of existing data on socio-economic benefits with a focus on forest dwellers (SOFO 2014) found that current approaches for measuring the socio-economic benefits from forests are often limited due to the lack of consistent and reliable data. The role of forests in global development thus remains

underestimated or unknown in certain subsectors. This prevents potential consideration of forest benefits production and consumption in policy-making for social welfare (Hogarth 2014, UNFAO 2003a, UNFAO 2016, Vedeld et al. 2004), and recognition of the role of forests for social transformation, through education, communication and improved awareness (Temu 2013).

Whilst the forest industry does manage plantations in some areas worst affected by social inequality, commercial plantation forestry does provide numerous social benefits to the adjacent rural communities dependant thereon. Westoby (1967), as cited in Hobley (2005), indicates that, "*Forestry is not about trees, it is about people, and it is about trees only insofar as trees can serve the needs of people*".

Contemporary studies and literature list some of the potential social benefits obtained from commercially planted forests as: increased job security; the supply of safety equipment; regular health check-ups; an increase in employment; education; improved infrastructure; and integrated agricultural practises (Mamba 2013, UNFAO 2010b), many of which are explored in this study.

1.6.2 Economic benefits

Globally, the forest industry is a major economic contributor employing 13.2 million people in the formal forest sector and 41 million in the informal sector (FAO 2014, World Bank 2016), with an annual gross value of USD606 billion. Data for the gross value in the forest sector per region (**Appendix E**) indicate that the African continent contributes USD17 billion per annum (FAO 2011).

The South African forest industry is seen as a valued contributor to the GDP with a steady average growth in contribution (currently at 1.1% per annum), and an increase in exports from ZAR9.5 billion in 2001 to ZAR15 billion in 2011 (DAFF 2015a). The forest industry in the study area (the Mpumalanga Province) contributes 3.08% to the provincial Gross Geographic Product (GGP) (**Table 1.2**), which correlates to ca. 40% of total national forestry GDP (DWAF 2005a).

Table 1.2: Forestry contribution to provincial Gross Geographic Product.

Province (Region)	Forestry & forest products as % of provincial GGP	Regional forestry GGP as % of total forestry GDP	Forestry employment as % of provincial employment
Mpumalanga	**3.08**	**37.23**	**1.89**
KwaZulu-Natal	3.39	22.81	1.11
Limpopo	0.69	5.59	0.19
Eastern Cape	0.7	15.39	0.40
Western Cape	0.19	1.32	0.07
Total South Africa	**0.91**	**10.83**	**0.39**

Godsmark 2017.

The Center for International Forestry Research (CIFOR) (2003), however, states that within South Africa the rural forest-dependent communities are amongst the poorest in the world and are often economically marginalised. Evans et al. (2004) suggest that plantation forestry has the ability to significantly contribute to economic development, specifically in the industry's rural operational footprint. This in turn supports the UN SDGs, specifically Goal 8, which aims to *"Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all"* (IFPRI 2015).

Many of the forest benefits obtained are at a subsistence level and are therefore not included in national statistics (RECOFTC 2008, Temu 2013, UNFAO 2010b, UNFAO 2011). Within the last decade, an increasing awareness of the importance of forest income in the livelihoods of poor people, especially those living in rural areas, has emerged and this has led to large-scale national studies by organisations including the CIFOR Poverty Environment Network (PEN) and the Program on Forests (PROFOR) Poverty-Forests Linkages Toolkit (UNFAO 2016). These initiatives are linked directly to Goal 1 of the UN SDGs which aims to *"End poverty in all its forms everywhere"* (IFPRI 2015).

In South Africa, the forest industry is an important and stable source of employment, especially in the rural areas within which the forest industry operates. In 2012, more than 166 000 people were employed by the local forest industry, with 93 000 being directly employed in forest-based operations and a further 73 000 in subsequent down-stream manufacturing and value adding operations (DAFF 2015a). In the Mpumalanga Province, the forest industry provides 1.89% of provincial employment (**Table 1.2**), which is significant due to the 32% unemployment rate within the province (DWAF 2005d). Furthermore, in Mpumalanga, where plantation forests amount to 39% of the provincial land area, the investment in forestry is the highest per province in the country at 42%, or ZAR10.7 billion, out of a national total of ZAR25.6 billion (DAFF 2016b).

Plantation forestry in the study area, and globally, has the potential to provide numerous economic benefits to those communities adjacent to, and dependent on, its resources. Mayers (2006) suggests that often benefits obtained in the informal forest sector, especially in terms of NTFPs, outweigh those of the formal sector. In Kenya for example, the formal forest sector generates ca. USD2 million per annum whilst the informal sector contributes ca. USD94 million in value to the local rural communities' dependent thereon. For example, fuelwood, as an individual commodity, is utilised as the primary source of energy by 80% of the local rural population in the study area, amounting to a gross national value of ZAR3 billion per annum (DWAF 2005a). Many such NTFPs, and their contribution to the household income, are explored in this study.

1.6.3 Environmental benefits

Due to the negative portrayal of the commercial plantation forest industry and its impact on the environment (Temu 2013), any beneficial aspects have been underestimated (Evans et al. 2004), as has its ability to support and maintain ecosystems and the provision of any services (UNFAO 2015a). A more balanced approach is required wherein all the negative and positive impacts are reviewed holistically. Environmental activist groups advocate that the success of commercial forestry plantations is at the expense of the environment (Tewari 2001). However, limited mention is made as to the numerous environmental benefits obtained through plantation forests on a landscape level, some of which include: soil stabilisation; protection of water catchments (Evans et al. 2004); and the mitigation in global warming through carbon sequestration (CIFOR 2003). World Bank (2016) states that the value of ecosystem services (ESs) obtained from forests and trees are often overlooked because they are not easily quantified or monetized. According to World Bank (1986), the ability to effectively and comprehensively quantify the social and environmental services provided by forestry activities remains a key issue.

The majority of these environmental benefits form part of forest provisioning ecosystem services (FPESs) at a landscape level for which limited data is available on establishing their exact value as produced by South African forests (DWAF 2005a). The use of forest ecosystems by rural communities has long been recognised (Kalaba et al. 2012), and understanding the importance of which, forms the third focal area of this study.

Ecosystem Services Overview

Sinclair (1999) states that in rural communities' forests and trees provide a wide range of ecosystem services that support local livelihoods. Olivier (2010) defines ecosystem services as "*the outputs of ecological systems that generate quality of life or well-being for people. An ecosystem service is a product that emerges from processes or features within natural environments, which enhances human well-being and is directly used by people."* or "*the benefits people obtain from ecosystems*" (Chirwa et al. 2017).

Communities benefit directly from healthy ecosystems (CIFOR 2003), supported by sustainably managed forests. The potential environmental benefits obtained by forest dependent communities within the Mpumalanga Province, in terms of ecosystem services, includes products of natural ecological systems which improve the well-being and quality of life of the beneficiaries (Bredenkamp and Upfold 2012, Temu 2013). It is proposed that these FPESs can be grouped into four categories, namely:

- Provision of goods and/or services – including water supply, food (e.g. honey, mushrooms, et cetera.), fibre, fodder and numerous NTFPs (e.g. Medicinal plants, reeds, et cetera.);
- Regulatory services – including soil stability, flood reduction, micro and meso climate management, nutrient cycling, pollination, et cetera;
- Information and spiritual services – including historically and culturally important information, natural heritage, learning sites, et cetera, and;
- Supporting services – including suitable cultivation sites, aesthetic value and cultural amenities, et cetera (Bredenkamp and Upfold 2012, Olivier 2010, UNFAO 2016).

In Sub-Saharan Africa, where the majority of the population live in rural areas with a lack of infrastructure, these ESs have relevance for those communities' dependent thereon (Kuyah et al. 2016). For example, Chamshama and Nwonwu (2004) propose that plantation forests provide an ecosystem benefit to local communities by regulating the local microclimate through mitigating temperature fluctuations and reducing wind speeds, thereby enhancing human and livestock habitats. Kuyah et al. (2016) further propose that microclimatic conditions, including air and soil temperature, relative humidity, solar radiation, wind speed, et cetera, are favourably altered in ca. 61% of areas where they are assessed.

Hogarth (2014) proposes a further benefit for the rural poor in terms of Payment for Environmental Services (PES), a concept explored by Angelsen and Wunder (2003) to include the following four main compensation mechanisms: carbon storage and sequestration; biodiversity conservation; hydrological services; and ecotourism.

Payment for Ecosystem Services (PES) can make a significant contribution to household income, especially in poor rural communities (ibid). Whilst many PES schemes may not report the number of beneficiaries, it is evident that the recognition of the potential of PES as an income source in Africa is lacking. For example, only 2 000 people benefit from PES in South Africa compared with 217 750 people benefiting in Asia and Oceania (UNFAO 2014).

Whilst limited data is available on the exact value of such ESs from South African forests (DWAF 2005a), an assumption is that each of the above four categories of services are to some extent available to, and utilised by, the local communities within the study area. Although some studies have found that people living in and around protected ecological areas support conservation and the controlled usage thereof, their attitudes towards and appreciation of nature is directly related to any benefits obtained (Holmes 2007).

Although 27 ecosystem services provided by forests are recognised (Olivier 2010), only seven of the more commonly recognised FPESs are considered in this study, namely improved water quality, protected biodiversity, wind break, shade, shelter, soil stabilisation, and water runoff protection. It is important that these environmental benefits need to be viewed beyond their immediate physical and biological impacts, in terms of their impacts on the welfare and livelihoods of communities' that are dependent on them (Evans et al. 2004).

1.7 Literature Review Summary

This literature review provides an understanding of the history, development and status quo of the forest industry in South Africa, the legal frameworks and rationale for a Sustainable Forest Management (SFM) and Participatory Forest Management (PFM) approach, and the various principles developed for their implementation and management. Insight was provided into the improvised state of rural forest communities' and their dependence on the forest resource for Non-Timber Forest Products (NTFPs) and Ecosystem Services (ESs) vital for the sustenance of their livelihoods. To develop a better understanding of the dependence of rural communities on the forest resource, an in-depth study of the Social, Economic and Environmental benefits obtained is necessary. This information would also provide the basis upon which a PFM arrangement, with the local communities and land claimants, could function, providing communities access to ca. 60% of SAFCOL land in the near future.

1.8 Problem statement

Following the 1994 democratic elections in South Africa, the current government embarked on a land reform programme aimed at redressing the pre-1994 racially-based dispossession of land. Initially this dispossession was enacted by European colonialists as a result of the Natives Land Act of 1913 (Mamba 2013), and subsequently by the white minority government under the National Party Apartheid Regime (Lahiff 2001). The legal basis for this redress was through the enactment of the Restitution of Land Rights Act (Act 22 of 1994) (Ziqubu 2006). This Act "*provides for the restitution of a right in land to a person or community dispossessed under or for the purpose of furthering the objects of any racially based discriminatory law*" (Restitution of Land Rights Act 1997), as well as the Natives Land Act of 1913. Around 26% of state-owned land, which included all primary industries, was identified for redistribution (Ramutsindela et al. 2016). As a consequence, ca. 50% of the commercial afforested land in South Africa is subject to land claims (Clarke 2006, Mamba 2013, UNFAO 2004). Despite this positive intent, there have been negative consequences regarding this process, such as disputes around proposed changes in land-use and the perceived slow rate of restitution, amongst others, which have led to deterioration in land-user and land claimant relationships (Borras Jr and Franco 2010).

Historically, most African countries made use of state departments dedicated to the management of their forest areas with limited local community involvement (Raphael and Swai 2009). In South Africa, private corporate companies (61.9%) manage the majority of afforested land, with the remaining distributed between commercial farmers (17%), small growers (3.7%), the state through the Department of Agriculture, Forestry and Fisheries (DAFF) and municipalities (7%), and the state-owned South African Forestry Company Limited (SAFCOL) (10.5%) (Godsmark 2017). With ca. 60% of the land managed by SAFCOL currently under land claim (SAFCOL 2009), there is an increasing need to engage in a more productive manner with affected communities so as to be more inclusive in terms of all associated forest operations (Ham et al. 2010). This can potentially be achieved through the establishment of collaborative and participatory forest management approaches. The role of government in this process remains of critical importance in terms of policy formulation and implementation, as well as in the creation of circumstances within which communities can benefit from products and services provided by forests (Chirwa et al. 2017). According to UNFAO (2014), "*the extent to which people benefit from forests is strongly influenced by government action, including the types of benefits people have access to, who benefits, and how much*".

For land claimant communities to secure access to long-term and sustainable social, environmental, and economic benefits from common forest resources, they must have a vested interest in and actively participate in, the management of the forest. There is currently limited and/or fragmented information on social forestry (Vedeld et al. 2007, Wollenberg 2000) in terms of community engagement and their inclusion within forest practices and management decisions.

1.9 Research objectives background

Forestry research in South Africa has traditionally focused on technical aspects of forest management such as site-species matching, tree breeding, silviculture and harvesting, as opposed to socio-economic benefits obtained by stakeholders (Bradley and Jones 1995). To fully understand the potential environmental, social, and economic benefits that can be obtained from forests, a more holistic approach needs to be adopted. In addition to fibre and wood, UNFAO (2015a) proposes that forests are also fundamental for food security and improved livelihoods through increased community resilience. These are enabled through the provision of food, wood energy, shelter, fodder and fibre, the generation of income and employment opportunities. It is thus important that within South Africa the forest industry considers the basic needs of adjacent communities which may be impacted by any forest related operations (SAFCOL 2016). An opportunity exists whereby this study explores a participatory approach to ensure 'broad sense' sustainability, by providing the data necessary for constructive land claimant engagement, as well as for achieving numerous certification standards and transformation goals.

1.9.1 Main objective

The main objective of this study is to identify forest products and forest provisioning ecosystem services, which are perceived by local communities, especially land claimants, as being important through actively participating in forestry operations and management.

Null Hypothesis: Land claimants and adjacent communities perceive there to be no tangible benefits to be derived from participating in forest operations and management.

1.9.2 Specific objectives and associated research questions

1. To evaluate the perception of local communities regarding the potential social benefits to be obtained through participatory forest management
    1.1 How do plantation forests currently impact on the social well-being of adjacent communities?

1.2 What are the most important social benefits obtained directly and/or indirectly from plantation forests?

2. To evaluate the perception of local communities regarding the potential economic benefits to be obtained through participatory forest management
    2.1 To what degree are communities economically directly and/or indirectly dependent on plantation forest resources?
    2.2 What household level of income is obtained directly/indirectly from plantation forests?
3. To evaluate the perception of local communities regarding the potential environmental benefits to be obtained through participatory forest management
    3.1 Which environmental benefits are currently obtained directly and/or indirectly from plantation forests?
    3.2 Have plantation forests improved the local environment and ecosystem services obtained?

1.10 Potential contributions of the study to the South African forest industry

Through the participation of land claimants and local communities in forest management, this study will provide insight into the perceptions/needs of local communities and land claimants towards the potential benefits of forestry as a land use option. Outcomes from this study will be used to guide management decisions regarding:

- establishing robust relationships with stakeholders, especially land claimants, through vested interest, thereby ensuring the longevity of the forest industry post-land transfer;
- empowering the land claimant communities through employment, education, et cetera;
- accelerating land claim settlements;
- ensuring transformation objectives, as set out in the Broad Based Black Economic Empowerment (BBBEE) Act (and further supported through the Forest Sector Transformation Charter Council), are met, thereby improving BBEE levels and thus corporate competitive advantage;
- meeting certification standards associated with community engagement and development, thereby securing market share; and
- reducing corporate risk in terms of fire and civil unrest, through inclusivity and vested interest.

1.11 Ethical considerations

Due to the sensitive social nature of the research conducted during this study, the questionnaire was designed, structured and conducted according to the guidelines set out in the 1979 Belmont Report on Ethical Principles and Guidelines for the Protection of Human Subjects of Research. Furthermore, ethics approval was sought from, and granted by, the Nelson Mandela University Human Ethics Committee prior to the commencement of this study (**Appendix A**).

1.12 Limitations of study

This study focuses on the perceived benefits of community participation in terms of commercial forest management and activities. Any negative impacts of the forest industry, for example stream flow reduction, an increase in fire risk, et cetera, were excluded from the study as these types of factors do not contribute to achieving the study objective. For a holistic view of the forest industry, a more encompassing approach regarding Social, Economic and Environmental impacts, whether positive (being benefits) or negative, needs to be explored in depth (Chown 2001). This was not possible within this study, but the outcomes may be used to direct further, in-depth studies.

Whilst the study area falls within the Mpumalanga Province, which has the highest concentration of plantations in South Africa at 10% of the total land area (Chown 2001), outcomes obtained from this study may vary for other forestry regions nationally. However an assumption will be that the findings of this study can be used to infer benefits to the broader domestic industry and adjacent communities.

An additional assumption was that the primary data obtained from the structured questionnaire were truthful, accurate and free of systematic errors. Systematic errors occur when respondents provide biased answers so as to project a more positive or negative impression of themselves or their circumstances (Van Rensburg et al. 2010).

The term *forests* has been used to describe both plantation forests as well as indigenous (natural) forests, unless otherwise stated. This is practical since the boundaries between planted and natural forests is often poorly defined, and the benefits obtained from planted forests are often similar to those obtained from natural forests (Dyck 2003).

Lastly, limited documentation/data exists as to any achievements obtained from the inclusion of local communities in PFM, especially when exploring plantation management and any improvement of the standards of living of adjacent communities (Chirwa et al. 2017). Wollenberg (2000) and Vedeld et al. (2007) indicate that this is mainly due to inconsistent

research methodology in social forestry research, especially with regards to PFM, which has resulted in limited utilisable information and comparable data.

Chapter 2: Methodology

This chapter provides general information of the study area in terms of location and biophysical characteristics. It also provides the method of sample selection, data collection, questionnaire structure, and data analysis.

2.1 Description of study area

The study was conducted in the Mpumalanga Province of South Africa and focused on communities adjacent to SAFCOL forestry plantations. The study area was located within two district municipalities, namely Gert Sibande, with a population of 1.04 million (Statistics SA 2011), and Ehlanzeni with a population of 1.68 million (ibid). Whilst only 23.8% of the total Mpumalanga Provincial area (78 370km^2) has been identified as being arable for commercial crop production, including agriculture and forestry. Furthermore, this province has the highest concentration of plantation forests in South Africa at 39% of the provincial land area (Bethlehem and Dlomo 2003, Chown 2001, DAFF 2016b, Mahlangu and Sekgota 2005). This translates into 52% of the total 1.2 million ha of afforested area nationally (DAFF 2011).

The study was spread over a distance of 201 km, from Blyde Plantation in the north (adjacent to Graskop), to Roburnia Plantation in the south (adjacent to Amsterdam) (**Figures 2.1, 2.2,** and **2.3**). Within this area, five study sites were identified adjacent to SAFCOL forestry plantations, namely Blyde, Brooklands, Roburnia, Tweefontein and Wilgeboom Plantations (**Table 2.1**). These plantations are constituted primarily of *Pinus* species, grown on a 25-30 year saw-timber rotation.

The selection of study sites was based on:

- SAFCOL Plantations, on which 14 community land claims have been registered (Mamba 2013);
- The close proximity of the communities to the identified SAFCOL plantations;
- The use of adjacent communities which have entered into social contracts with SAFCOL's Socio-Economic Development department and are thus critical stakeholders of the SAFCOL plantation area; and
- An even distribution of the plantations and communities within the province to account for variation in terms of the environment (linking climate/physiography to land-use and productivity), and ethnic gradient (ethnic groups).

Table 2.1: Demographics associated with the five study sites (**Figures 2.1, 2.2,** and **2.3**).

Plantation	Plantation size (ha)	Location within Mpumalanga	Communities Represented
Wilgeboom	6 317	North	Bushbuckridge, Sandford, Mariti
Brooklands	8 761	Central	Brondal, Geelhoutboom
Tweefontein	12 130	Central	Simile, Harmony hill, Pilgrim's Rest
Blyde	7 010	North	Leroro, Matibidi, Hlabekisa, Moremola, Graskop
Roburnia	10 479	South	Amsterdam , Kwathendeka, France, Fernie, Diepdale, Davedale, Syde, Dundonald, Bettysgoed, Wayvelly, Redhill, Mayflower, Glenmore, The Glen, Lothair, Warburton, Stafford

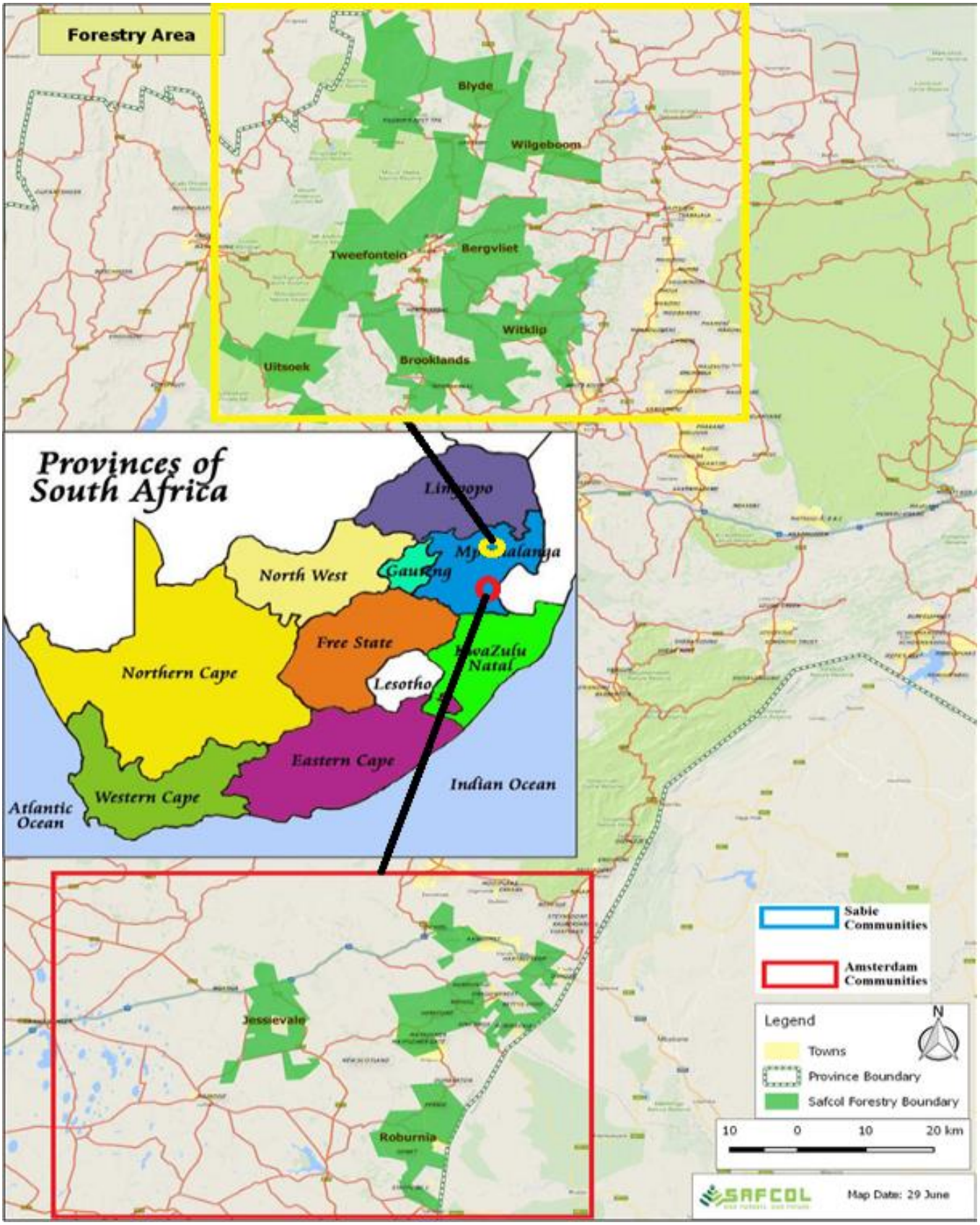


Figure 2.1: Overview of two study areas in eastern Mpumalanga in relation to SA (SAFCOL plantation map 2017, Explore South Africa 2010).

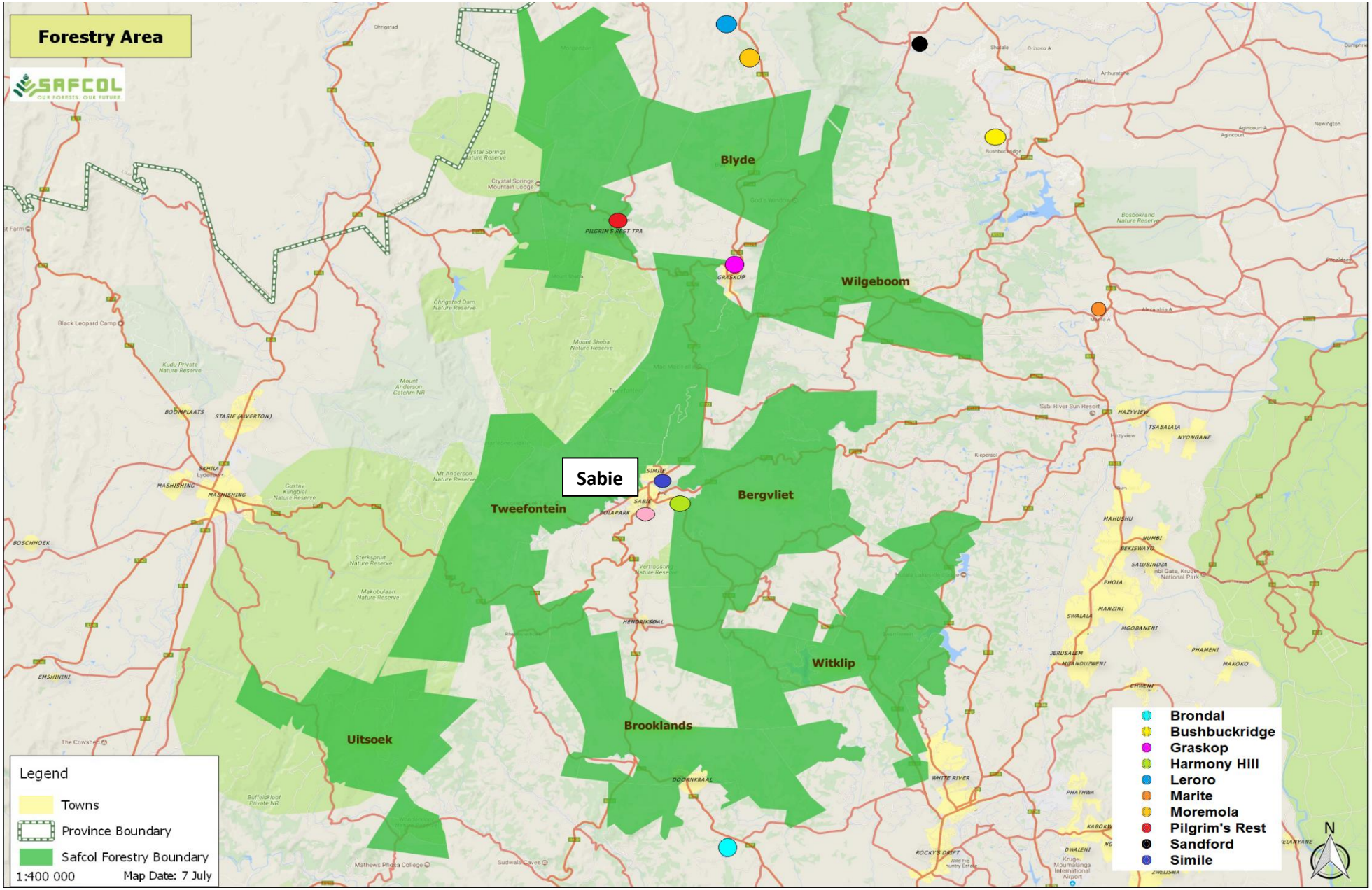


Figure 2.2: Sabie study area showing location of communities engaged (SAFCOL plantation map 2017).

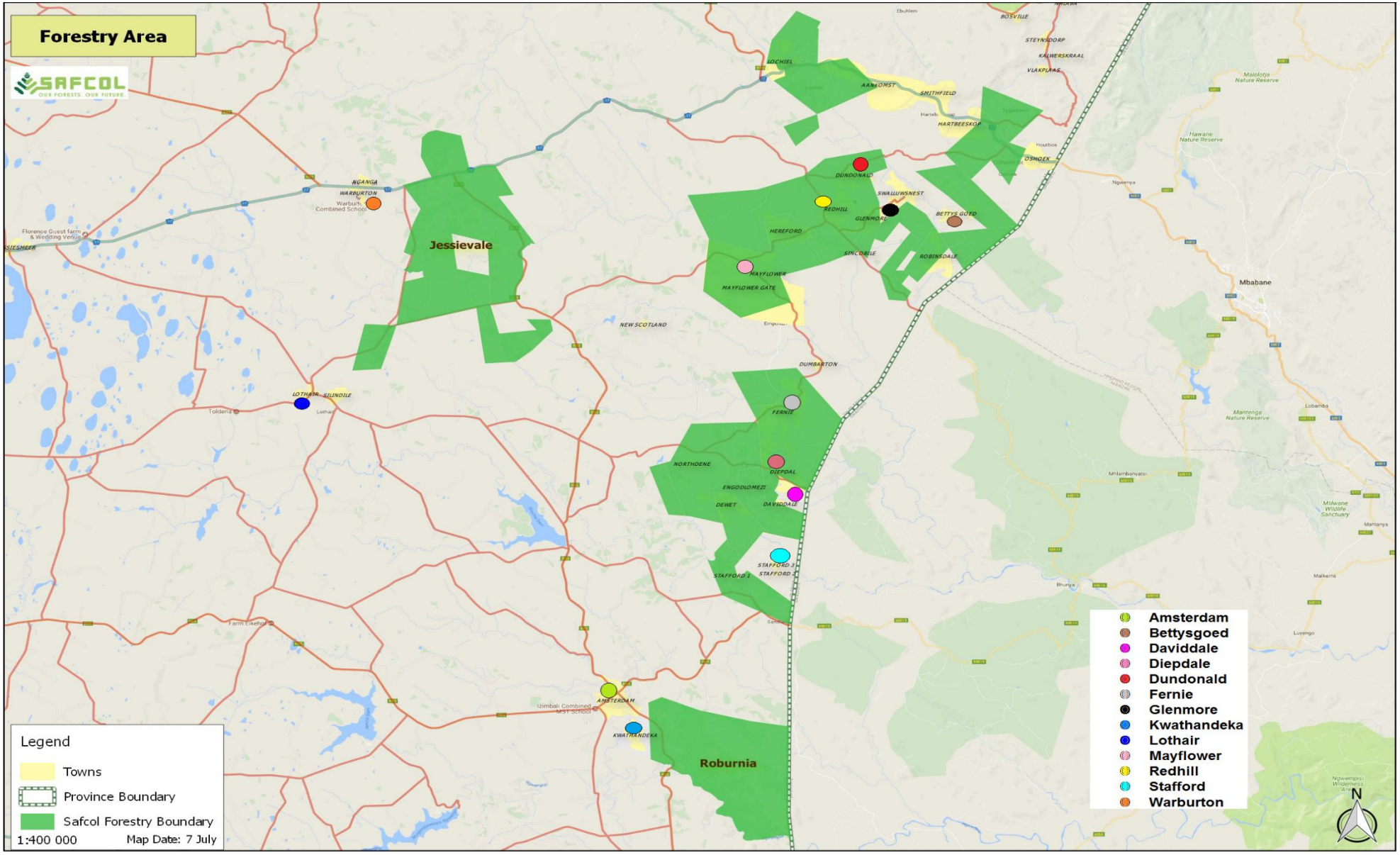


Figure 2.3: Amsterdam study area showing location of communities engaged (SAFCOL plantation map 2017).

2.2 Sample selection (selection of households within communities)

Due to the size (area and population numbers) of the communities surveyed, household sampling was conducted as opposed to individuals. A household is defined as an arrangement made by persons, individually or in groups, who provide themselves with food and other essentials for living (Makiwane et al. 2012). Sampling at a household level is more practical when collecting data from large populations, and is less costly and time consuming than would be found in surveying the entire population (Bless et al. 2006, de Vos et al. 2005). A constraint with this sampling practice, as opposed to surveying all individuals in the entire population, is the reduced ability to account for variability, and hence the detection of significance for all assessments conducted (in particular those with marginal significance). According to Nguru (2007), for this method of data collection, the benefits of increasing sample size (sample units and numbers within sample units) in terms of the detection of significance diminishes beyond 30 samples. Similarly, Bartlett et al. (2001) and Shackman (2001) recommend a sample size of between 5 and 30% of the population. Due to the lack of reliable population numbers available for these thirty rural communities, a household sample size of 46 was selected, which according to van Rensburg et al. (2010) exceeds the minimum of 30 subjects required when applying statistical techniques to results. As an initial/pilot study the intention was to obtain an understanding of the key areas of beneficiation amongst communities, enabling future studies to conduct in-depth research into specific areas of interest. This limited sample size was thus considered adequate, which was further confirmed by Pauw (2016[1]).

The details of each land claim and the relevant community representative's details are maintained by the SAFCOL Land Claims unit for engagements relative to the settlement of land. The identification of which communities to survey was provided by the SAFCOL Socio-Economic Development department. Individual households within these communities were selected through participation in the Joint Community Forum (JCF) structure, which is representative of all the households within the broader communities.

Due to potential repercussions for respondents divulging their collection of forest products, often without formal permission being obtained, the structured questionnaires were administered anonymously. This negated the possibility to link the individual households to a specific study site, yet allowed the respondents security in non-disclosure and hopefully encouraged more open and honest responses.

[1]J. Pauw, Statistician, School of Natural Resource Management, Nelson Mandela University, George

2.3 Data collection within samples (within each household)

The focus of this study were specific rural households in communities of the Mpumalanga Province with registered land claims on SAFCOL administered land (**Appendix C**). Due to the rural location of the study areas, and the social nature of the data collected, two potential methods of data collection were considered:

- Rural Rapid Appraisal (RRA), which is used within social science as an extractive research methodology to learn from the community by extracting the relevant data and analyzing it independently of the community (Jackson and Ingles 1998).
- Participatory Rural Appraisal (PRA), which aims to facilitate the learning process through de-emphasising inherent hierarchy. This allows the assessor to learn with the community, as opposed to from it (Cavestro 2003). The PRA approach is frequently used when assisting communities find local solutions to local problems, as opposed to extracting and analyzing data independently based on predetermined criteria and objectives. Although the PRA approach relies largely on team work, research data collection for this study was limited to the assessor.

For this study the RRA approach, using the structured questionnaire (**Appendix B**), was selected as the most appropriate means for the collection of data.

2.3.1 The structured questionnaire

A structured questionnaire provides specific direction in terms of the types of questions and data obtained from the household representatives about the community. Where necessary, open-ended questions were included to allow for further elaboration and explanation. As it was anticipated that some respondents would be illiterate, and to ensure the clarity and accuracy of the data collected, a translator/scribe was used for administering the questionnaire, as advocated by Cavestro (2003).

The questionnaire was structured according to main sections related to demographic information about the households, and any perceived economic, social and environmental benefits (**Table 2.2**). More detailed questions were used to obtain data to provide insights, and allow for an interpretation of the research questions.

Table 2.2: Main sections and focal points of the structured questionnaire (full questionnaire provided in **Appendix B**).

No.	Main sections	Sub-sections
1	Demographics	Land claimant status of household Age of household members Position of respondent in household (e.g. household head, son, et cetera) Gender of household members (e.g male, female) Ethnic grouping (e.g. Zulu, Xhosa, et cetera) Literacy and education levels within household (e.g. literate, illiterate, et cetera) Representation on local Joint Community Forums
2	Perceived Economic benefits	Employment status of household members (e.g. temporary, et cetera) Occupation of household members (e.g. forestry worker, teacher, et cetera) Income sources within household (e.g. wage, forest products, et cetera) Percentage of household income obtained from forest Level of economic benefits obtained from the forest NTFP obtained from forest (e.g. firewood, thatch grass, fruit, et cetera) Frequency of NTFP collection (e.g. daily, weekly, et cetera) Cost saving through provision of forest amenities (e.g. forest road access, et cetera)
3	Perceived Social benefits	Identification of social benefits obtained (e.g. school, clinic, training, et cetera) Frequency of social benefit utilization Importance of social benefit to household (e.g. limited, moderate, et cetera) Social benefit collection per gender
4	Perceived Environmental benefits	Identification of environmental benefits obtained (e.g. Wind break, reduced soil erosion) Frequency of environmental benefit utilization (e.g. daily, weekly, et cetera) Importance of environmental benefit to household Environmental benefit collection per gender

2.4 Data analysis[2]

Questionnaire data were captured electronically prior to analysis, which was conducted using the Statistical Package for the Social Sciences (SPSS 20) software, and Microsoft Excel. The analysis was conducted at a household level for the 46 households surveyed. Sample size and representativeness differs with population homogeneity, the availability of resources and the type of research, with sample sizes of between 30 and 100 considered adequate for qualitative research (Sarantako 1998).

Descriptive statistics, including means, standard deviations and frequency tables, were used to summarize responses for each question in the structured questionnaire and to conduct a univariate analysis of each variable. Inferential statistics were used to make inferences about the population and included:

a) Pearson Product Moment correlations to determine the significance of relationship between continuous variables (for n = 42 if |r| > = 0.304);

[2] The guidance and support of Dr D. Venter, Statistician at Nelson Mandela University, on the appropriate statistical procedure for this study is acknowledged.

b) Chi² tests to determine the significance of the relationships between selected demographic variables and other key questionnaire variables; and
c) Inferential ranking to determine the relative importance of selected sub-sets of the questionnaire items.

For inferential ranking, the variables were ranked using matched-pair *t*-tests to determine statistical significance ($p \leq 0.05$), and Cohen's *d* for practical/commercial significance ($d > 0.20$), such that:

a) the mean of the first variable in Significance Group *i* differs statistically and practically from the mean of the first variable in Significance Group (i+1); and
b) the mean of all variables in Significance Group *i* do not differ significantly from the mean of the first variable in that group (Gravetter and Wallnau 2009).

Inferential statistics results were deemed significant if the outcome was both statistically significant ($p \leq 0.05$) and also practically significant (Cohen's $d > 0.20$ for *t*-tests and Cramér's $V > 0.10$ for Chi² tests). Where appropriate, bar graphs and pie charts were used for visual presentation and explanation of the results.

Since this was an initial study, exploring the broad inter-relations between rural communities and benefits provided by the forest resource, with the aim of developing a better understanding for in-depth future studies and refined hypotheses, a *p* value of ≤ 0.1 was considered sufficient (Labovitz 1968). Whilst it is acknowledged that the power of a test varies directly with the size of the sample, the standard error however varies inversely with the sample size (*n*). Thus larger error rates (≤ 0.1) should be considered for smaller sample sizes (*n*) (Fisher 1950, Labovitz 1968). As such a *p* value of ≤ 0.1 was thus considered as weakly significant in this study.

Chapter 3: Results

This chapter presents the results of this research study related to demographics (3.1), and more specifically the perceptions of the respondent communities and land claimants with regards to social (3.2), economic (3.3) and environmental (3.4) benefits derived from the forest resource. The basic unit of measure was at a household level, where composition varied greatly (**Table 3.1**).

Table 3.1: Household demographics for respondent households.

Characteristics	Frequency (n = 46)	Percentage (%)
Gender		
Male	24	52.2
Female	22	47.8
Land claimant status		
Land claimant	12	26.1
Non-land claimant	34	73.9
Age groups (years)		
18 - 35	23	50.0
36 - 55	13	28.4
> 55	9	19.6
Relationship to Household Head		
Household Head	22	47.8
Spouse	5	10.9
Son	4	8.7
Daughter	8	17.4
Grandchild	1	2.2
Sibling	3	6.5
Grandparent	1	2.2
Other	2	4.3
Marital Status		
Single	28	60.9
Married	16	34.8
Divorced	1	2.2
Widowed	1	2.2
Literacy Levels		
Illiterate	2	4.3
Literate	38	82.6
Semi-literate	6	13.0
School level attained		
Has not graduated	1	2.2
Primary School	4	8.7
High School	30	65.2
TVET	5	10.9
University Student/ Graduate	6	13.0

Characteristics	Frequency (n = 46)	Percentage (%)
Ethnic Group		
Foreign	1	2.2
North Sotho	3	6.5
Sepedi	9	19.6
Swazi	19	41.3
Tsonga	4	8.7
Venda	1	2.2
Zulu	9	19.6
Distance to forest resource		
0km (live on)	6	13.0
0-1km	11	23.9
1-3km	12	26.1
3-5km	4	8.7
> 5km	13	28.3
Representation on local forest forum		
Yes	29	63.0
No	17	37.0
Type of employment		
Full time	30	65.2
Temporary/Occasional	8	17.4
Not applicable	8	17.4
Reasons for not working		
Retired	3	6.5
Student	3	6.5
Cannot find a job	5	10.9
Not applicable	35	76.1
Occupation		
Farmer	3	6.5
Craftsman	1	2.2
Forestry Worker	4	8.7
Civil Servant	7	15.2
Teacher	3	6.5
Student	17	37.0
Unemployed	5	10.9
Other	5	10.9

3.1. Demographics

3.1.1. Age

The respondents were grouped into three age classes: youth as defined by the National Youth Policy (NYDA 2015) (18 to 35 years); middle-aged (36 to 55 years); and elderly (older than 55 years) (**Table 3.1**). Half the respondents were between 18 and 35 years of age, with 93.5% (*n = 43*) within the economically active age group of 18 to 65 years old.

The age of the head of the household ranged between 20 and 82 years old with an average age of 48.6 years. A weakly significant relationship *(p = 0.061; n = 45*) was found between age and the status as head of the household, wherein 75% were over the age of 40 years. The mean overall age of respondents was 38.3 years, with a median age of 32 years. Although the median age is slightly higher than the provincial median age of 23 years (Wazimap 2017), this variation was anticipated as the provincial data includes youth below 18 years of age. Youth below 18 years of age were purposely excluded from the study on ethical grounds (being minors), and since the contribution of this age range in the collection of forest products and the utilisation of FPESs was considered limited. No relationship *(p = 0.497; n = 45*) was found to occur between the three age categories, and the level of education attained (**Table 3.2**).

Table 3.2: Age group/category relative to school level attained.

Age group (years)	School Level Attained				
	Has not graduated from any institution	Primary School Student/ Graduate	High School student/ Graduate	Vocational (Trade) Institution Student/Graduate	University Student/ Graduate
18 - 35	0	1	16	3	3
36 - 54	1	2	5	2	2
+55	0	1	8	0	1

3.1.2. Gender

The gender division of overall respondents, at 52% male versus 48% female, varied from the gender division of the heads of household's which were 73% male versus 27% female. The age of female respondents ranged between 18 and 62 years as compared to the males which ranged between 23 and 82 years. No relationship *(p = 0.268; n = 22*) was found between gender and the school level attained, specifically in terms of heads of households.

3.1.3 Education and literacy

The literacy levels within the study area were found to be: 82.6% literate; 13% semi-literate; and 4.4% illiterate. No significant relationship *($p = 0.991$; $n = 46$)* was found in the literacy level and gender of respondents. However, 16% of the responding land claimants were illiterate, whilst none of the non-land claimant respondents were illiterate. A quarter of land claimants stated they had never received training provided by the forest industry, compared to 8.8% of non-land claimants. Furthermore, 83.3% of land claimants stated they received no educational benefit (e.g. bursaries) when compared to 47% of non-land claimants who had.

The majority (86.4%) of household heads within this study were literate, 13.6% were semi-literate, and none were illiterate. Whilst no direct relationship was found between the age groups and the school level attained *($p = 0.497$; $n = 45$)*, an important consideration was that more of the younger generations (being 18 – 35) attained post-secondary school education (being vocational and/or tertiary), when compared with the over-55-year age group, where only one respondent had post-secondary school education (**Table 3.2**).

3.1.4 Ethnicity

Six South African ethnic groups were represented by the respondents, with three ethnic groups making up the majority (81%), these being: Swazi at 41% (*n = 19*); Sepedi at 20% (*n = 9*); and Zulu at 20% (*n = 9*). The Brondal community, near Brooklands plantation, recorded one foreign respondent.

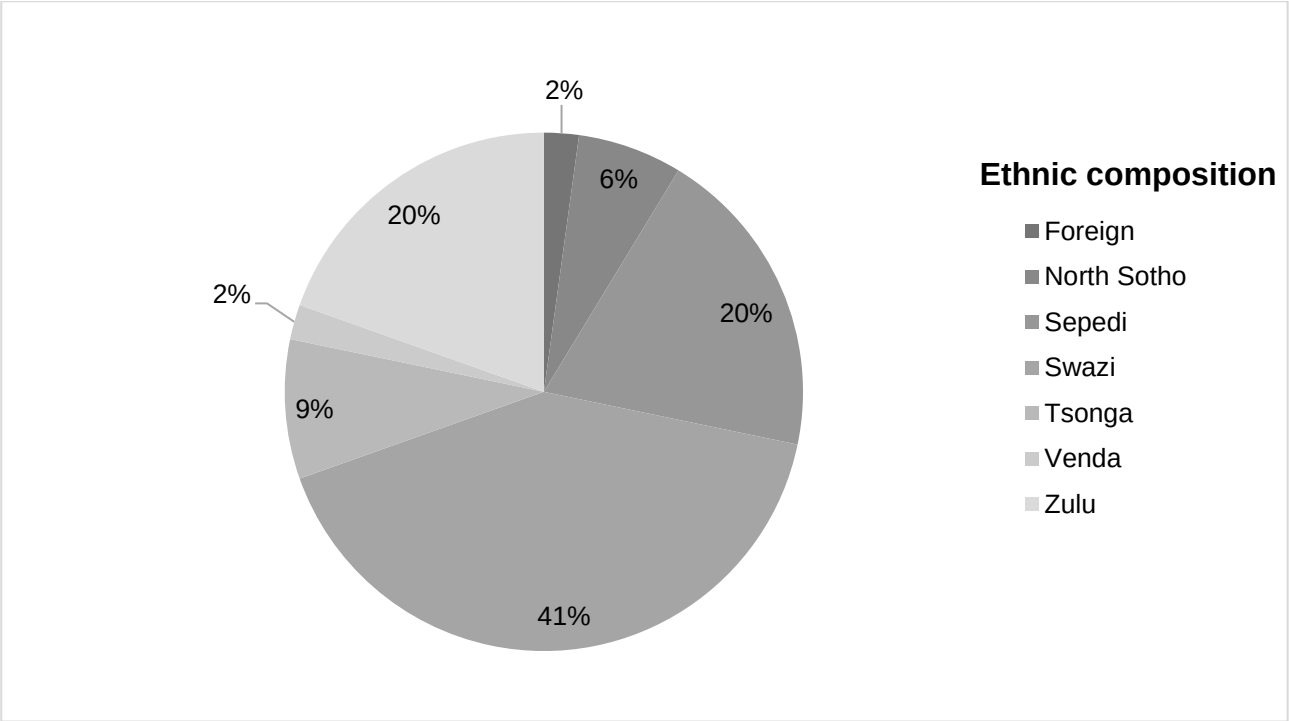


Figure 3.1: Ethnic distribution amongst respondents.

Due to the relatively small sample size, no statistical relationship could be found between the ethnicity of respondents and their collection of, and/or preference for specific forest products, for example the collection of fuelwood (*p = 0.507; n = 46)*.

Whilst the number of respondents per ethnic group varied within the sample, different forest products were considered of high importance for the various ethnic groups represented (**Table 3.3**). For example the Swazi, Tsonga and Zulu ethnic groups had a preference for the widest variety of forest products, whereas only medicinal plants were considered as being of high importance to the Northern Sotho.

Table 3.3: Distribution of forest products perceived as being of high importance to the various ethnic groups.

Ethnic Groups	Forest Products									
	Fire wood	Thatch grass	Medicinal plants	Fruit	Honey	Grazing livestock	Hunting/ Bush meat	Building material	Sand mining	Reeds for weaving
Foreign			X							X
North Sotho			X							
Sepedi			X					X		
Swazi			X			X	X	X	X	
Tsonga		X	X			X		X	X	X
Venda		X						X		X
Zulu					X	X		X		

3.1.5 Location

The distance between the individual respondent's residence and the forest resource varied across the study area in relation to the SAFCOL plantations in the Mpumalanga Province, even more so when considering their status as land claimants or non-land claimants (**Figure 3.2**).

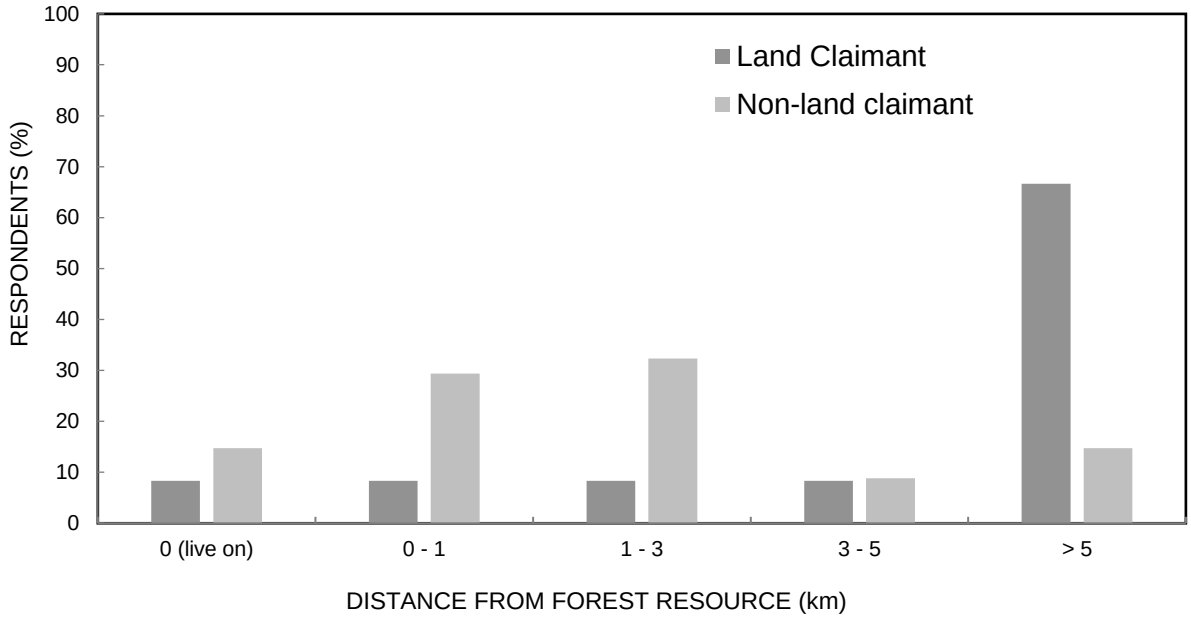


Figure 3.2: The relationship between land claimant status and the distance of their dwelling from the forest resource.

A weak relationship was found *($p = 0.090$; $n = 46$)* between the land claimant status of respondents and the distance of their dwelling from the forest resource. Only 17% of land claimants reside within 1 km of the forest resource as compared to 44% of non-land

claimants. This trend is compounded in that 66.7% of the land claimants live in excess of 5 km from the forest, compared to only 14.7% of non-land claimants.

3.2. Social benefits

In terms of social benefits, two central themes became apparent within this study, the gender and land claimant status of respondents. The social benefits were therefore further explored in relation to these two central themes, which would provide increased understanding in terms of their importance and utilisation as provided by the forest industry (**Table 3.4**).

Table 3.4: Importance and utilisation of social benefits, by the gender and land claimant status of respondents.

Social benefit	Utilisation level	Gender		Land claimant status	
		p-value	n-value	*p*-value	n-value
Employment	Importance	0.444	46	0.602	46
	Utilisation	**0.003**	33	0.163	46
Traditions and Customs	Importance	0.633	46	**0.006**	46
	Utilisation	0.511	46	**0.001**	46
Education and Training	Importance	0.318	46	0.088	46
	Utilisation	**0.001**	37	0.070	46
Healthcare	Importance	0.906	46	0.760	46
	Utilisation	0.066	46	0.074	46
Enterprise Development, Corporate Social Investment, and Socio-economic Development	Importance	0.136	46	**0.002**	46
	Utilisation	0.076	46	0.021	46
Road and traffic	Importance	0.174	46	0.123	46
	Utilisation	0.134	46	0.053	46
Safety, security and risk	Importance	0.246	46	**0.004**	46
	Utilisation	0.505	46	0.051	46

Shaded cells and Bold text indicate significance at $p < 0.1$ and $p < 0.05$ respectively.

Preferences were found for the utilisation of social benefits and services provided by the forest industry when taking gender into consideration (**Figure 3.3**). For example, males made significantly greater use of the access to gravesites, the protection of traditions and customs, collection of building materials, and Enterprise Development (ED) projects than women, who placed significantly more emphasis on the utilisation of healthcare facilities, road access, and the importance of job security provided by the forest industry than men.

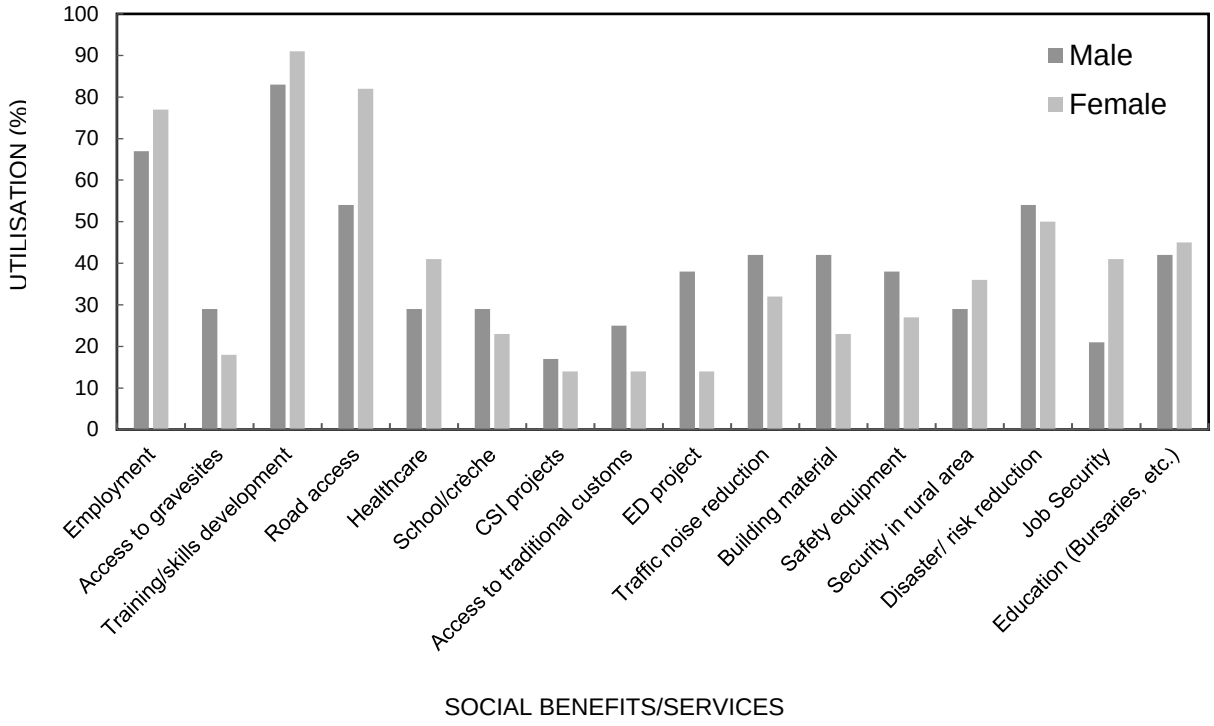


Figure 3.3: Social benefit utilisation (%) by gender for communities in Mpumalanga.

Similarly, a clear distinction was found for the utilisation of social benefits when comparing land claimant and non-land claimant respondents (**Figure 3.4**), with a significantly higher utilisation of access to gravesites and the protection of traditions and customs by land claimants when compared to non-land claimants.

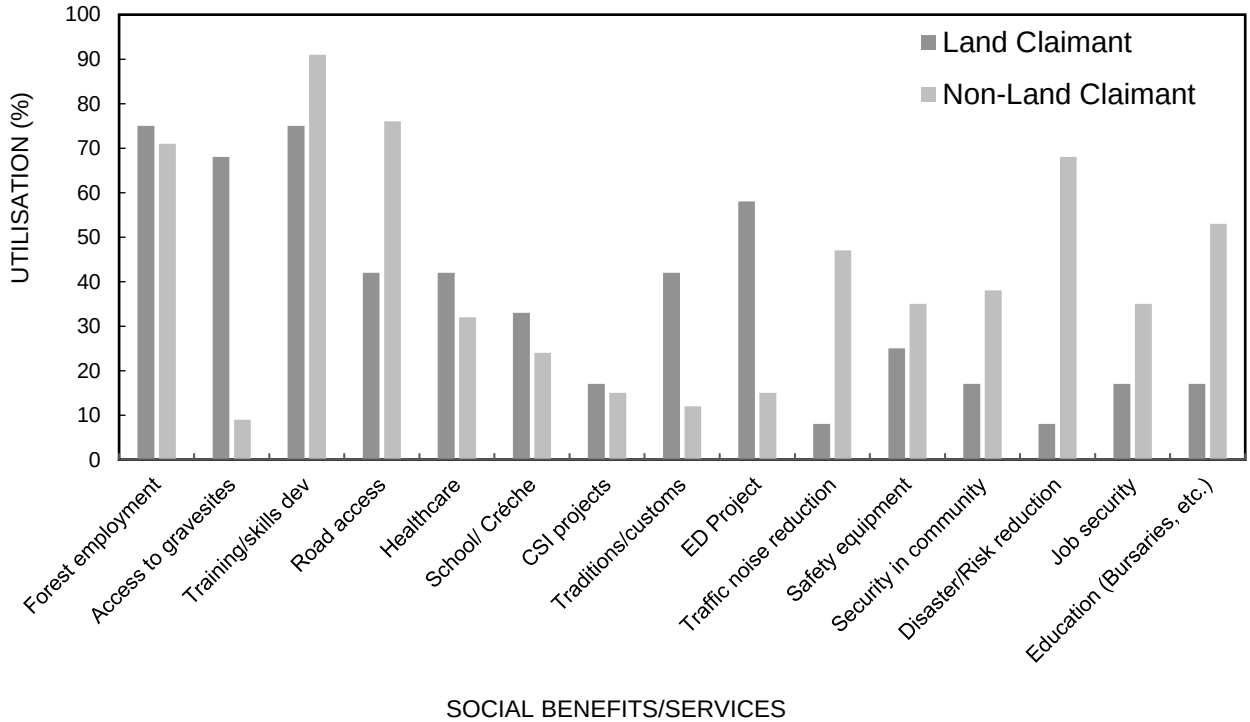


Figure 3.4: Social benefit utilisation (%) by land claimant status for communities in Mpumalanga.

3.2.1 Employment

Although the cited unemployment level of respondents in the study area was 10.9%, 19.6% had not worked in the last 3 months. The main reasons for not working were given as being Fulltime students (6.5%) and Could not find employment (10.9%).

Of the 30.4% of respondents who indicated that they had job security due to forestry operations, the majority (66%) were females. A significant relationship *(p = 0.003; n = 33)* was found between gender and employment, where 77.3% (*n = 17*) of women and 66.7% (*n = 16*) of men benefited from employment in the forest sector. Although no relationship *(p = 0.431; n = 38*) was found between the land claimant status and employment in the forest sector, of interest is that 88% of land claimants cited this as their highest social benefit in contrast to 57% (*n = 19*) of non-land claimants.

Overall, 48% of respondents indicated that employment was of high importance to their household, with 52.2% citing this as their priority social benefit from the forest. On further exploration as to what would be considered as a benefit associated with securing employment in the forest industry, income was the primary reason, followed by access to education for their children (**Figure 3.5**).

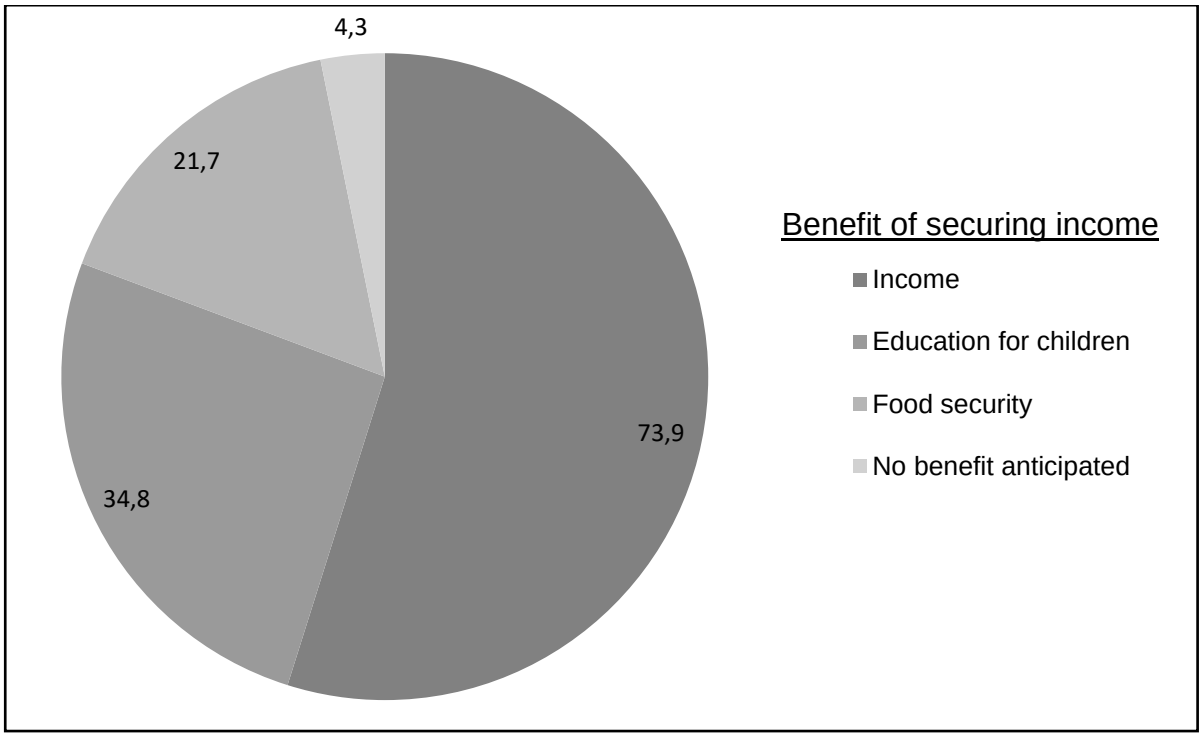


Figure 3.5: Perceived benefits (%) of securing employment in forest industry.

3.2.2 Traditions and customs

Overall, 19.6% of respondents indicated that access to plantations to observe/maintain traditions and customs was a benefit, and of these 78% indicated that this access was of high importance to their household. Similarly, one fifth reported visiting family gravesites at least once a month.

Although no relationship *($p = 0.453$; $n = 9$)* was noted between gender and access to customs and/or gravesites, an 11% higher utilisation was made by males (27%) compared to females (16%).

Further exploration of the level of importance of this access found that no respondent cited this benefit as being of low importance (**Table 3.5**). Furthermore, for access to ensure the maintenance/observance of tradition and customs, 37.5% of land claimants cited the benefit as being of high importance to their households.

Table 3.5: Level of importance for access to traditions, customs and gravesites by land claimant versus non-land claimant respondents.

Land Claimant (Y/N)	Importance of access to gravesites		Importance of access and protection of traditional customs		
	Average	High	Limited	Average	High
Yes	2	5	0	1	4
No	2	1	1	0	3

Whilst no statistical relationship *($p = 0.302$; $n = 38$)* was found for the utilisation of the *protected access to traditions and customs* on forestry land by land claimants when compared to non-land claimants (**Table 3.6**), 54% of land claimants utilised this benefit compared to a 10.3% utilisation by non-land claimant respondents.

Table 3.6: Utilisation of access to traditions and customs by land claimants versus non-land claimants.

Land Claimant (Y/N)	Utilisation of Access to gravesites		Utilisation of Access & protection of traditional customs		
	Bi-weekly	Monthly	Daily	Weekly	Monthly
Yes	0	8	0	0	5
No	1	2	1	1	2

3.2.3 Education and training

Three modes of education and training provided through the forest industry were explored: School (crèche, primary and secondary schooling); Training/Skills development (vocational short skills interventions); and Education (bursaries).

There was a 52.2% (26.1 – 87%) average utilisation across the three disciplines, with Training/Skills development being the highest at 87%. On average, a third of respondents felt these three benefits were of high importance to their household.

A significant relationship was found between gender and Training/Skills development ($p < 0.001; n = 37$) and Education ($p = 0.029; n = 19$). Furthermore, there was a weak relationship ($p = 0.098; n = 46$) when comparing the education and training of land claimants versus non-land claimants. Fourteen percent more non-land claimants utilised these three benefits compared to land claimants, however of specific concern was the 36% increase in bursaries awarded to non-land claimants over that claimants (**Table 3.7**).

Table 3.7: Utilisation (%) of various education modes by land claimant versus non-land claimant respondents.

Land Claimant (Y/N)	Utilisation of Training (%)	Utilisation of School/crèche (%)	Utilisation of Education (Bursaries) (%)	Average utilisation (%)
Yes	75	33	17	42
No	91	24	53	56

No relationship ($p = 0.559; n = 46$) was found between land claimant status and the importance of education and training provided by the forest industry.

3.2.4 Healthcare

Overall, 34.8% of respondents utilised healthcare facilities (clinics) provided by the forest industry, with 37.5% of these utilising them daily. A weakly significant relationship ($p = 0.060; n = 17$) was found in terms of the gender distribution and utilisation of healthcare, (35.4% male versus 38.6% female), with 70.5% citing this benefit as being of high importance to their household.

Ten percent more land claimants utilised heath care facilities than non-land claimants (42% versus 32% respectively). Although weakly significant ($p = 0.074; n = 46$), land claimants only utilised these facilities once a month, whilst 18% of non-land claimants utilised them daily. Although no relationship ($p = 0.760; n = 46$) was found between land claimant status and the importance of these healthcare facilities, 45.7% indicated a direct

cost saving, in terms of money, time and/or effort, with 38.5% of those citing a high cost saving for their household.

3.2.5 Enterprise development, corporate social investment and social economic development

Fifteen percent (15.2%) of respondents utilised either a Corporate Social Investment (CSI) project (e.g. a community hall, or Early Childhood Development centre) provided by the forest industry, with 57.2% of these utilising it on a daily basis, and 85.8% indicating these benefits were of high importance to their household. Through the utilisation of forest industry provided School/Crèche/Early Childhood Development Centres, a third of respondents indicated that it saved on household costs of which 40% cited the saving as being high. Similar results were obtained in terms of the utilisation of Community Halls.

Furthermore, a quarter (26.1%) of respondents benefited through a forestry enterprise development project (e.g. a community business), with two-thirds (66.7%) of these benefiting on a daily basis, and 83.3% indicating this benefit as being of high importance to their household. It was however found that no significant relationship existed between gender, and either CSI projects *($p = 0.212$; $n = 7$)* or Enterprise Development projects *($p = 0.782$; $n = 11$)*.

Furthermore, no relationship *($p = 0.957$; $n = 46$)* was found between land claimant status and the utilisation of CSI projects specifically, however a significant relationship *($p = 0.021$; $n = 46$)* was found in terms of forestry enterprise development (FED) project utilisation and land claimant status, where 58.3% of land claimants utilise FED projects versus 14.7% of non-land claimants. Of interest was the significant relationship *($p = 0.002$; $n = 46$)* between the perceived importance of FED projects by land claimants, in contrast with the non-significant relationship between land claimant status and the importance of CSI projects *($p = 0.771$; $n = 46$)*.

3.2.6 Road and traffic

Sixty-seven percent (67.4%) of respondents utilised forestry roads, of which 83.9% did so on a daily basis. This benefit was found to be high in rural areas where little infrastructure exists, with three-quarters (76.7%) indicating forest roads were of high importance to their household.

As most rural roads in South Africa are gravel, with households built adjacent to roads for improved access, there is an associated increase in dust and noise pollution for which a

tree barrier was seen as a distinct benefit by 37% of respondents. Furthermore, 54.3% of respondents acknowledged a cost savings through the utilisation of access provided by forest roads, 60% of which rated the saving as high. Utilising Inferential Ranking of the Mean to determine levels of importance, the use of the forest road network obtained the highest priority in terms of cost saving benefit for communities.

Whilst a weakly significant relationship *(p = 0.080; n = 29*) existed between gender and forest road utilisation, no relationship *(p = 0.343; n = 17*) existed between gender and traffic noise abatement. Similarly, no relationship was found between land claimant status and the utilisation of forest road networks *(p = 0.472; n = 38*), nor for the road traffic noise abatement *(p = 0.464; n = 38*).

3.2.7 Safety, security and risk

One-third of respondents benefited through the supply of safety equipment (e.g. Personal Protective Equipment) of which 73.3% utilised this equipment on a daily basis. Due to the secluded location of many plantations, security patrols are provided with 32.6% of respondents benefiting from the increased security in rural residential areas. Of these 73.3% indicated daily benefits, with 80% seeing increased security as being of high importance to their household.

Similarly, half (52.2%) the respondents benefited from reduced disaster and risk exposure (e.g. fires, wind, theft, et cetera) due to support from the forest industry, with a further half of these indicating that they benefited daily in this manner. Of the respondents benefiting from increased safety and security, 75% indicated this benefit had a high importance to their household. When questioned specifically about the risk of fires, 63% (*n = 29*) indicated that the forest industry provided them with fire protection services.

A weakly significant relationship was found between gender and the security benefit in the rural areas *(p = 0.097; n = 13*), as well as the issuing of safety equipment *(p = 0.072; n = 15*). No relationship *(p = 0.351; n = 38*) was found in terms of land claimant status and their access to safety equipment. The provision of safety equipment, increased security in rural areas due to forest patrols, and the reduction in fire risk did not feature in the top three social benefits listed by land claimants.

3.2.8 General

Emphasis is often placed on economics as the primary focus of forest operations, however it is becoming increasingly important that companies also contribute positively to adjacent rural communities in terms of social upliftment and quality of life (SAFCOL 2009).

Over-and-above the tangible social benefits discussed, many non-tangible social benefits exist and include the “calm and peaceful” environment provided by forests, with 95.7% (*n = 44*) of respondents acknowledging and appreciating the aesthetic value of the forests (55.5% of respondents indicated this was of high importance to their household). A weakly significant relationship *(p = 0.056; n = 43*) was found between the land claimant status and the overall social benefits obtained from the forest resource. Half the land claimant respondents cited the social benefits obtained from the forest industry as being the most important benefits to them (**Table 3.8**), as compared to the economic and environmental benefits, which is in contrast with the 13% of non-land claimants who cited the same importance to these social benefits.

Table 3.8: Overall social benefits ranked in scale of importance.

Land Claimant (Y/N)	Social benefits (%)		
	Most Important	2nd most Important	Least Important
Yes	50	25	25
No	13	45	42
Total	23	40	37

Sixty-three percent of households belonged to local forest-based Joint Community Forums (JCFs), with 78.3% believing that the forestry JCFs had improved social relations within their community. A further 84.8% (*n = 39*) indicated that the forestry JCFs had also been proactive in resolving community conflicts.

Moreover, 71.7% (*n = 33*) believed that the forest industry had improved the support obtained from government and non-governmental organisations, and 97.8% (*n = 45*) claimed that the industry has improved their social status and influence.

With 80.4% (*n = 37*) of respondents indicating that the forest industry had improved security within their communities, 97.8% (*n = 45*) felt forestry had directly improved their social wellbeing, and 80.4% (*n = 37*) indicated that forestry has improved their quality of life.

Half (52.2%) indicated employment as being their priority social benefit, followed by Training/Skills Development (23.9%) and then road access (15.2%).

3.3. Economic benefits

This section deals with the economic benefits derived from the forest resource by local communities and land claimants, specifically as they relate to the two central themes of the gender and land claimant status (**Table 3.9**) of respondents.

Table 3.9: Importance and utilisation of economic benefits, by the gender and land claimant status of respondents.

Economic benefit	Utilisation level	Gender		Land claimant status	
		***p*-value**	**n-value**	***p*-value**	**n-value**
Fuelwood	Importance	0.149	46	0.067	46
	Utilisation	0.366	46	0.722	46
Thatch grass	Importance	0.270	46	0.729	46
	Utilisation	0.626	46	0.170	46
Medicinal plants	Importance	0.080	46	0.397	46
	Utilisation	0.397	46	0.387	46
Fruit	Importance	0.100	46	0.146	46
	Utilisation	**0.028**	46	0.074	46
Honey	Importance	0.162	46	0.235	46
	Utilisation	0.344	46	0.235	46
Improved grazing of livestock	Importance	0.332	46	0.601	46
	Utilisation	0.909	46	0.119	46
Hunting/bush meat	Importance	0.372	46	0.769	46
	Utilisation	0.291	46	0.548	46
Building material	Importance	0.701	46	0.211	46
	Utilisation	0.384	46	0.081	46
Sand mining	Importance	0.792	46	0.671	46
	Utilisation	0.499	46	0.768	46
Aesthetic value	Importance	0.457	46	0.544	46
	Utilisation	**0.018**	46	0.318	46
Reeds	Importance	0.233	46	0.568	46
	Utilisation	0.589	46	0.065	46

Shaded cells and Bold text indicate significance at $p < 0.1$ and $p < 0.05$ respectively.

Gender preferences were found for the utilisation of economic benefits and services offered by the forest industry (**Figure 3.6**). Females obtained more economic benefits than the males, especially in terms of food stuffs such as honey, fruits, bush meat and medicinal plants. Males collected more than females in only three NTFPs, namely thatch grass, building material and reeds.

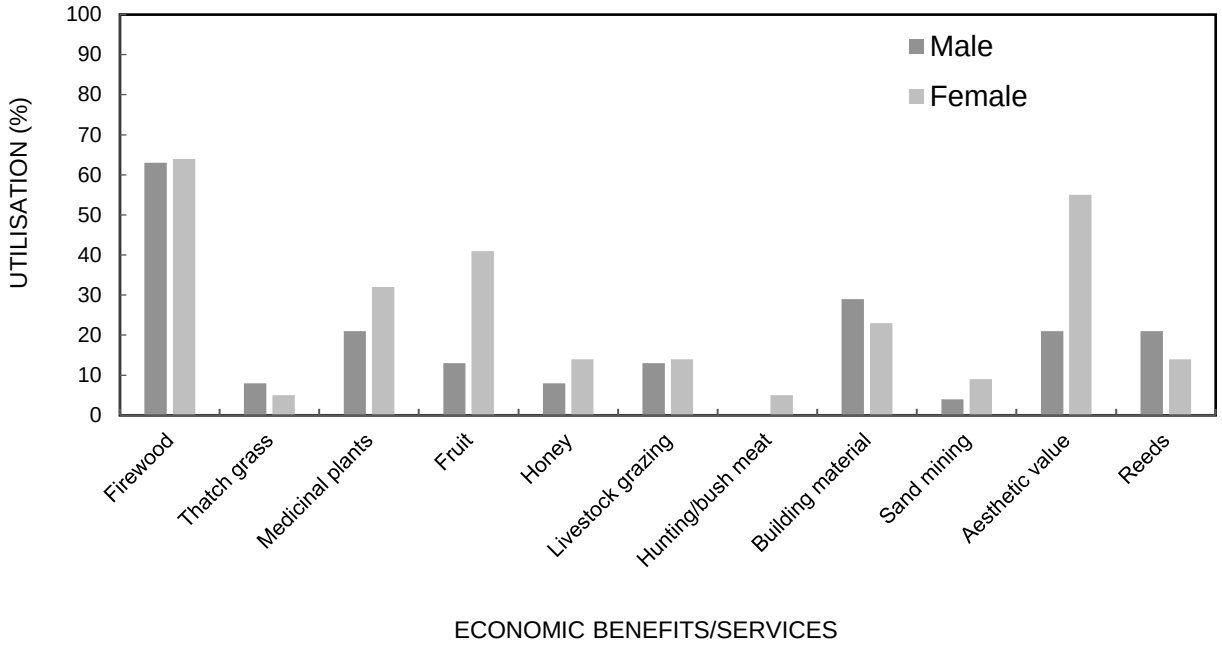


Figure 3.6: Utilisation of economic benefits/services (%) by gender for communities in Mpumalanga.

Similarly, a clear distinction was found between land claimant and non-land claimant respondents for the collection of economic benefits from the forest resource (**Figure 3.7**).

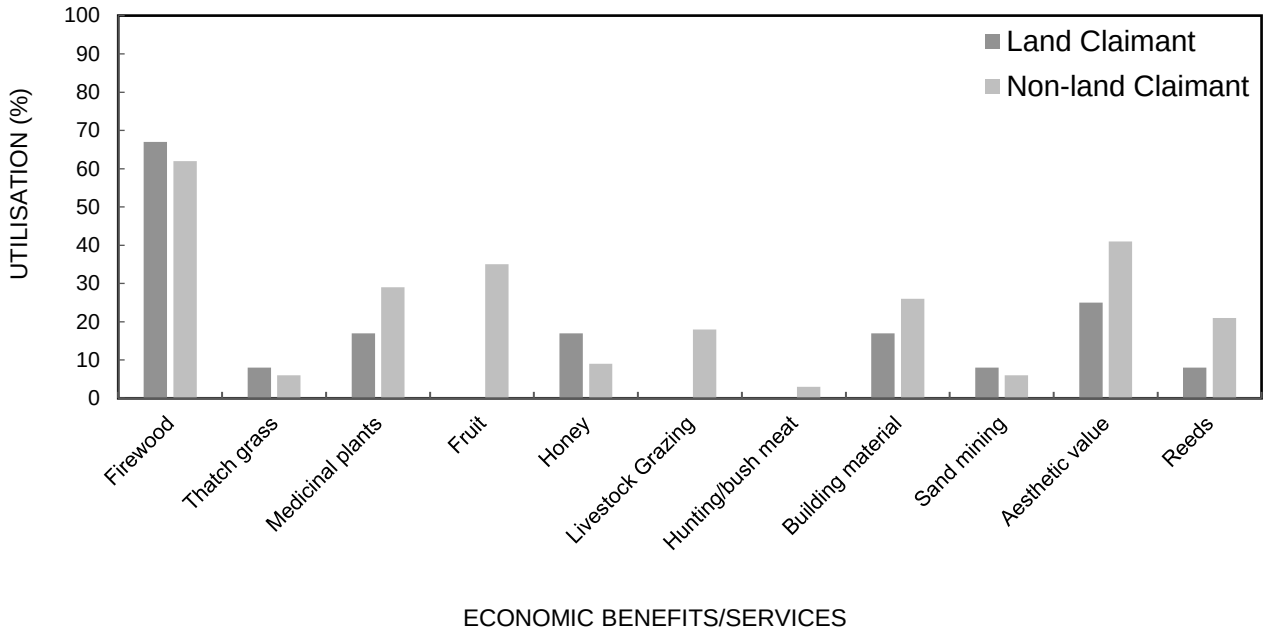


Figure 3.7: Utilisation of economic benefits (%) by land claimant status for communities in Mpumalanga.

Of importance is the higher utilisation of economic benefits by non-land claimants when compared to land claimants. The utilisation and importance for each of these economic benefits and services are considered individually against gender and land claimant status of the beneficiary.

3.3.1 Income sources

With 10.9% unemployment recorded amongst respondents, formal income was limited to the following occupations: forestry worker (8.7%); farmer (6.5%); civil servant (15.2%); teacher (6.5%); student (37%); craftsman (2.2%); and 10.9% for other occupations.

Informal income through the sale of forest products was obtained by 45.7% (*n = 21*) of respondents, with 13% of these indicating that forest products constituted in excess of 60% of their household income. Of those obtaining forest products, a limited number sell their produce (**Figure 3.8**). It was established that the majority of respondents collected these NTFPs to supplement formal income, and for subsistence use within their households.

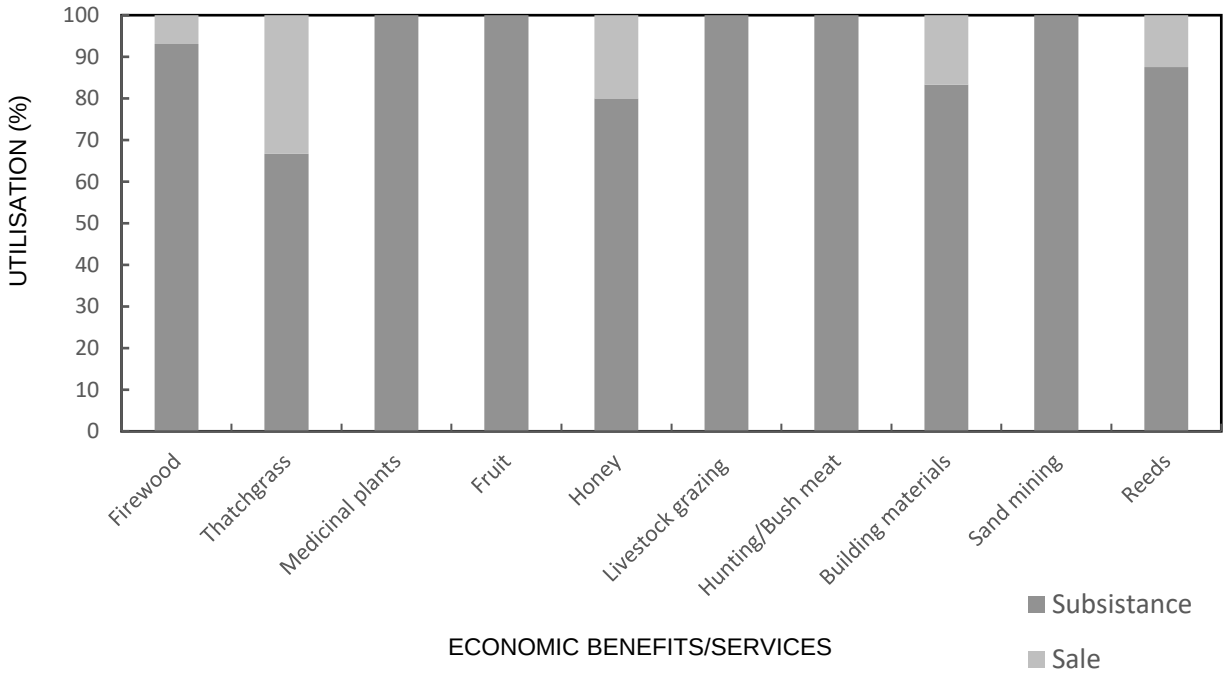


Figure 3.8: Utilisation of forest products (%): subsistence versus sale.

3.3.2 Non-Timber Forest Products

A fifth (21.3%) of the respondents collected and utilised the NTFPs, with 48.1% of these citing the NTFPs as being of high importance for their household. A third (32.6%) of respondents indicated that the ability to collect NTFPs in a sustainable manner from a forest was a benefit, with a quarter of these (26.7%) benefiting from NTFPs on a daily basis. An interesting finding was that land claimants sold a portion of the NTFPs collected, whilst the non-land claimants collected almost entirely for household use (**Figure 3.9**)

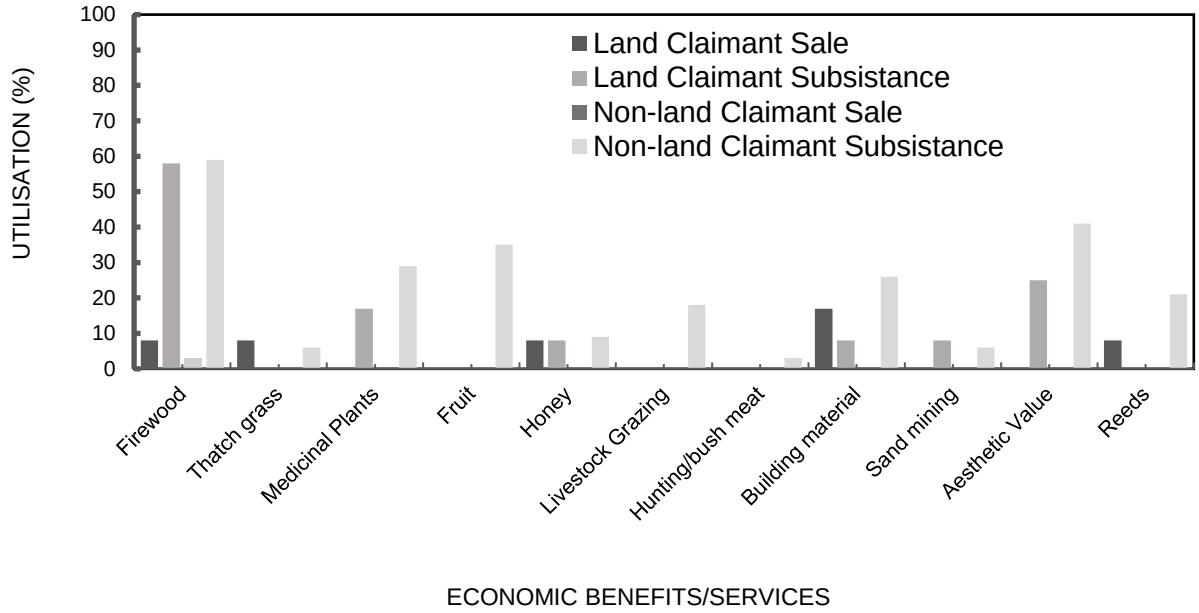


Figure 3.9: Utilisation of economic benefits (%) by land claimant status and sale versus subsistence use.

It was further found that male respondents sold a portion of the forest products they collected, whereas no sale was recorded by females for any of the forest products they collected (**Table 3.10**).

Table 3.10: Comparison in the collection and subsequent sale (%) of forest products by gender.

Forest product (NTFP)	NTFPs used for household consumption by gender (%)		NTFPs sold by gender (%)	
	Male	Female	Male	Female
Fuelwood	28	30	4	0
Thatch grass	2	2	2	0
Medicinal plants	11	15	0	0
Fruit	7	20	0	0
Honey	2	7	2	0
Grazing livestock	7	7	0	0
Hunting/bush meat	0	2	0	0
Building material	11	11	4	0
Sand mining	2	4	0	0
Aesthetic value	11	26	0	0
Reeds	9	7	2	0

3.3.2.1 Fuelwood

Whilst 63% (*n = 29*) of respondents collected fuelwood from the forest, 93.1% of these utilised it for subsistence, with the remainder (6.9%) selling theirs locally. Of those selling

fuelwood, 72.7% were land claimants. A third of respondents indicated that fuelwood was of high importance to their household. No relationship *(p = 0.366; n = 46*) was found between gender and the utilisation of fuelwood, with a weakly significant difference *(p = 0.051; n = 30*) in terms of the gender, with more women collecting fuelwood than men. Although 8.3% of men collected fuelwood on a daily basis, no women respondents cited collecting fuelwood on a daily basis, but rather on a weekly, bi-weekly or monthly basis.

No relationship was found between the land claimant status of respondents and utilisation of the fuelwood *(p = 0.722; n = 46)*, but a weakly significant relationship *(p = 0.059; n = 30*) was found in the gender of land claimants collecting fuelwood. Fifty percent more male land claimants collected fuelwood than female land claimants.

A weakly significant relationship *(p = 0.067; n = 46*) was found regarding fuelwood as a benefit between land claimants and non-land claimants. Inferential Ranking of the Mean indicated that fuelwood was the highest priority NTFP for community members, both for land claimants and non-land claimants.

3.3.2.2 Thatch grass

Of the 6.5% of respondents who indicated that they collected thatch grass from forestry areas, no significant relationship (*p = 0.248; n = 4*) was found in terms of the gender of those utilising it (*p = 0.626; n = 46*). However, twice as many females (67%) collected thatch grass compared to males (33%). Half of those collecting thatch grass indicated that it was of high importance to their household, however no relationship (*p = 0.270 n = 46*) was found between gender and the perceived importance of this NTFP. Similarly, no relationship (*p = 0.729; n = 46*) was found in the land claimant status and the perceived importance of this forest product. Furthermore, no relationship (*p = 0.170; n = 46*) was found in the land claimant status and the utilisation, however sales were recorded only amongst land claimant respondents.

Although no relationship (*p = 0.248; n = 4*) was found between land claimant status and gender in the collection of this NTFP, women land claimants accounted for 100% amongst land claimants, with only 33% for non-land claimants collected solely by women. Three-quarters of those collecting thatch grass did so on a monthly basis, as opposed to daily, weekly, or bi-weekly.

3.3.2.3 Medicinal plants

A quarter (26%) of respondents collect medicinal plants for household use, with no indication of sale of this NTFP. Over half (58.3%) of those collecting these plants indicated that they were of high importance to their household. Although no relationship existed between gender and the collection of medicinal plants ($p = 0.378; n = 11$), 59% was collected by women compared to 41% collected by men. No respondents cited collecting this NTFP on a daily basis, with the majority (63.6%) collecting it on a monthly basis.

No relationship ($p = 0.397; n = 46$) was found in the use of medicinal plants and the gender of the user, however a weakly significant relationship ($p = 0.080; n = 46$) was found for gender and the perceived importance of these NTFPs. In contrast, no relationship ($p = 0.397; n = 46$) was found between land claimant status and the importance of collection. Furthermore, no relationship was found in the land claimant status and the use ($p = 0.387; n = 46$) of the medicinal plants.

3.3.2.4 Fruit

A quarter (26.1%) of the respondents collected forest fruits for household consumption, with no indication as to whether this forest product was subsequently sold. Over half (53.8%) of those that collected forest fruit indicated that it was of high importance to their household.

Similar to the findings made for the collection of medicinal plants, no significant relationship ($p = 0.514; n = 13$) was found in the gender distribution of the collectors. However, females collected two-thirds (65.4%) compared to one-third (34.6%) by their male counterparts. Similarly, no relationship ($p = 0.629; n = 13$) was found in the land claimant status and the gender of the collector of fruit. A significant relationship ($p = 0.028; n = 46$) was however found between the use of the forest fruit and the gender of the user, wherein 40.9% of the female respondents utilised forest fruits versus only 12.5% of the males. No relationship ($p = 0.100; n = 46$) was found between gender and the importance of forest fruits for the household.

A weakly significant relationship ($p = 0.074; n = 46$) was found between land claimant status and the use of forest fruits, with a lack of use reported by land claimants compared to a 35% utilisation by non-land claimants. No relationship ($p = 0.146; n = 46$) was found in the land claimant status and the perceived importance of fruit, which was interesting due to the disparity in utilization. The timing of collection of forest fruits was consistent, with one-third collected daily and weekly combined, one-third collected bi-weekly, and a further third collected monthly.

3.3.2.5 Honey

Ten percent (10.9%) of respondents collected honey from the forest, with 20% of those indicating that it was of high importance to their household. No significant relationship was found between gender and the utilisation of honey (*p = 0.344; n = 46*), the collection of honey (*p = 0.361; n = 5*), or the perceived importance of this NTFP *(p = 0.162; n = 46*). Males however collected more honey than females (90% versus 10%).

In terms of the land claimant status, no relationship was found in the gender of the people collecting (*p = 0.576; n = 5*), the utilisation of the honey (*p = 0.235; n = 46*), or the importance of the honey (*p = 0.235; n = 46*). Of interest was that despite land claimant respondents rating this benefit as being of low importance to their households, a portion of the honey collected was sold, whereas no sale was cited amongst non-land claimants (where this NTFP was collected for subsistence use).

3.3.2.6 Improved grazing for livestock

The conservation of open grasslands inherent in forestry plantations, including the management of livestock access and grazing, results in improved fodder production in terms of quantity and quality. Thirteen percent of respondents cited improved grazing conditions from managed grasslands on forestry land as a benefit they utilised, with 87.5% of users citing this as being of high importance to their household. There was however no relationship (*p = 0.332; n = 46*) found for the gender distribution of those citing the importance of this benefit. Similarly, no relationship (*p = 0.909; n = 46*) was found in the use of the improved grazing by different genders.

No relationship (*p = 0.350; n = 7*) was found between land claimant status and gender for this forest benefit, nor in the utilisation thereof (*p = 0.119; n = 46*). Similarly, no relationship (*p = 0.60; n = 46*) was found in terms of the importance of this benefit for land claimants compared to non-land claimants.

3.3.2.7 Hunting/bush meat

Hunting for bush meat on forestry land was cited by one household. Whilst no relationships were found between gender and the use of bush meat *(p = 0.291; n = 46*), nor in terms of its importance *(p = 0.372; n = 46*), bush meat was obtained solely by females for household consumption. Furthermore, no relationship *(p = 0.548; n = 46*) was found between land

claimant status and the use of bush meat, with no land claimants citing any collection and/or use.

3.3.2.8 Building material

A quarter of respondents (*n = 12*) collected building materials from the forests, of which the majority (83.3%) was for household use, with the remaining 16.7% selling theirs locally.Two-thirds (63.6%) of those collecting this forest product indicated that it was of high importance to their household.

No relationship was found in terms of gender distribution for those collecting this forest product *(p = 0.513; n = 10*), the importance of this product *(p = 0.701; n = 46*), nor for its utilisation *(p = 0.384; n = 46*). More building material (60%) was collected by males than females (40%). A weakly significant relationship *(p = 0.081; n = 46*) was found between the land claimant status and use of the building material collected from the forest. Land claimants sold a portion which they collected, but non-land claimants collected solely for household use. No relationship was detected *(p = 0.274; n = 10*) in terms of gender and land claimant status, however collection amongst land claimants was restricted to males, whilst 45% of the collection by non-land claimants was by females.

3.3.2.9 Sand mining

Six percent (6.5%) of respondents collected sand from forestry land for household use, with no indication of sale for this NTFP. Forty percent of users cited this benefit as being of high importance to their household. The sand was collected by both males and females equally, with the majority (75%) being collected on a monthly basis. No relationship *(p = 0.499; n = 46*) was found in terms of gender of those collecting sand, nor in the importance (*p = 0.792; n = 46*) of this resource for households. Similarly, no relationship was found between land claimant status and the importance *(p = 0.671; n = 46*), nor for the use of this NTFP *(p = 0.768; n = 46*).

3.3.2.10 Aesthetic value

Thirty-seven percent of respondents acknowledged the inherent aesthetic value of forests, with two-thirds (64.7%) indicating that they appreciated it on a daily basis. Furthermore, over half (56%) of those benefiting from the inherent aesthetic value indicated that it was of high importance to their household. A strong relationship was found in the gender of those acknowledging the inherent aesthetic value of forests *(p = 0.018; n = 46*), however no

relationship was found in the gender and the perceived importance *(p = 0.457; n = 46*) of this benefit.

No relationship was noted in the land claimant status and the recognition and appreciation *(p = 0.318; n = 46*) of the inherent aesthetic value of forests, nor in the perceived importance *(p = 0.544; n = 46*) for the household.

3.3.2.11 Reeds

Seventeen percent (17.4%) of respondents obtained reeds from the forest, mainly (87.5%) for household use, with a third indicating that it was of high importance to their household. No relationship was found between gender and the collection of the reeds *(p = 0.293; n = 8*), nor in the utilisation *(p = 0.589; n = 46*), or perceived importance *(p = 0.233; n = 46*) for the households. It was however observed that 75% of the reeds were collected by females compared to 25% by males.

A weak relationship was noted in the land claimant status and the collection *(p = 0.065; n = 46*) of reeds, wherein the land claimants recorded some sales of the collected reeds whereas non-land claimants collected solely for household use.

3.3.3 Cost saving

Through the provision of a number of amenities, the forest industry has saved land claimants and the broader community a “cost”, in terms of time, money and/or effort (**Table 3.11**).

Table 3.11: Cost savings through forest industry provided amenities and the perceived importance of these for the community.

Forest product/benefit	Respondents acknowledging cost savings through forest amenities (%)	Users citing this cost saving as of high value to their household (%)
Forest road access	54	60
Firebreaks	39.1	22.2
Open grassland management	23.9	45.5
Conservation of indigenous forest	30.4	57.1
Health clinics	45.7	28.6
School/crèche/ Early Childhood Development Centre	32.6	40
Community hall	32.6	13.3

3.3.4 General

Whilst 70% of respondents acknowledged some level of economic benefit derived from the forest resource, a third cited the level of economic benefit derived by their household as being either high or very high.

Twenty-eight percent (28.4%) of those citing income from the forest resource claimed to derive more than 80% of their income from the forest. Whilst no relationship was found between the land claimant status and the overall economic benefits obtained, almost all the respondents (97.8%) stated that forestry had the ability to improve their economic situation, and that of the community at large.

3.4 Environmental benefits

Results related to the environmental benefits derived from the forest resource by local communities and land claimants are presented, specifically as they relate to the central themes of gender and land claimant status (**Table 3.12**).

Table 3.12: Importance and utilisation of perceived environmental benefits, by the gender and land claimant status of respondents.

Environmental benefit	Utilisation level	Gender		Land claimant status	
		p-value	n-value	*p*-value	n-value
Sustainable NTFP collection	Importance	0.457	46	0.395	46
	Utilisation	0.193	46	0.424	46
Improved water quality	Importance	0.934	46	0.009	46
	Utilisation	0.269	46	0.073	46
Protected biodiversity	Importance	0.494	46	0.091	46
	Utilisation	0.157	46	0.055	46
Wind break and dust reduction	Importance	0.800	46	0.230	46
	Utilisation	0.663	46	0.079	46
Shade	Importance	0.945	46	0.621	46
	Utilisation	0.853	46	0.717	46
Shelter	Importance	0.821	46	0.768	46
	Utilisation	0.566	46	0.788	46
Soil; erosion and fertility	Importance	0.631	46	0.112	46
	Utilisation	0.782	46	0.076	46
Runoff/flood protection	Importance	0.290	46	**0.027**	46
	Utilisation	0.155	23	**0.041**	46
Agroforestry	Importance	0.255	46	0.457	46
	Utilisation	0.439	14	0.128	46

Shaded cells and Bold text indicate significance at $p < 0.1$ and $p < 0.05$ respectively.

Preferences occurred for the utilisation of environmental benefits and services provided by the forests/forest industry in terms of gender (**Figure 3.10**). Excepting for protection of biodiversity, females recognised and obtained all the other environmental benefits more than males.

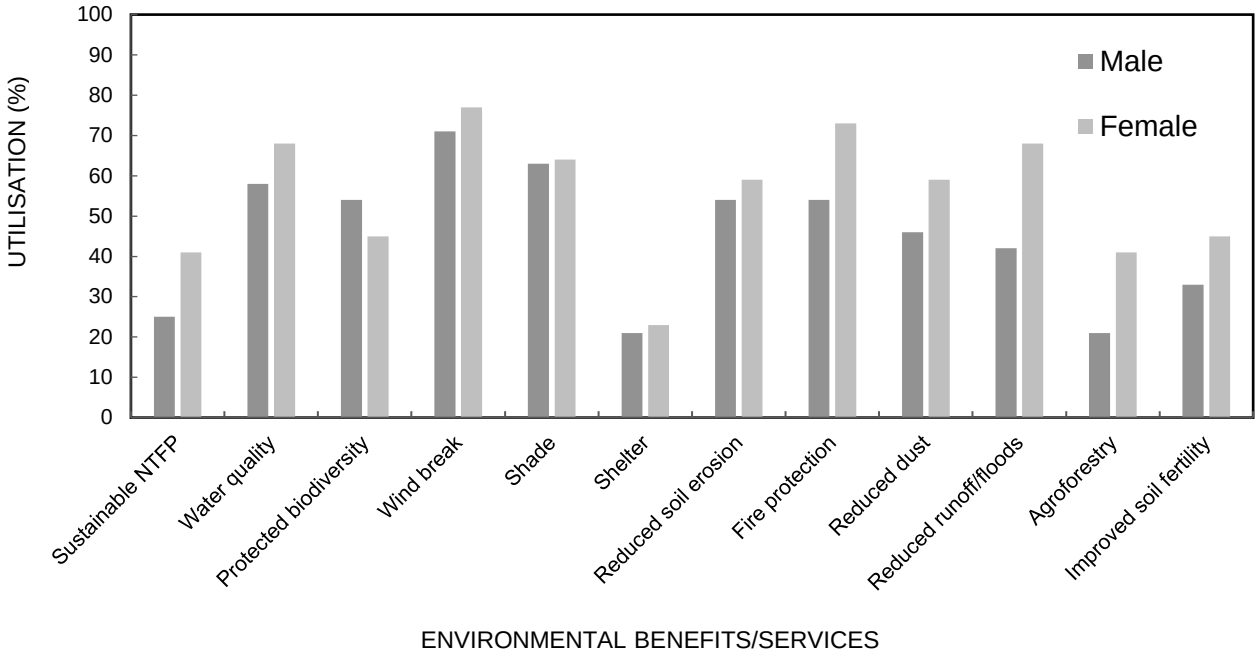


Figure 3.10: Environmental benefit utilisation (%) by gender for communities in Mpumalanga.

Similarly, a clear distinction was found in terms of the utilisation of environmental benefits when comparing land claimants with non-land claimants (**Figure 3.11**).

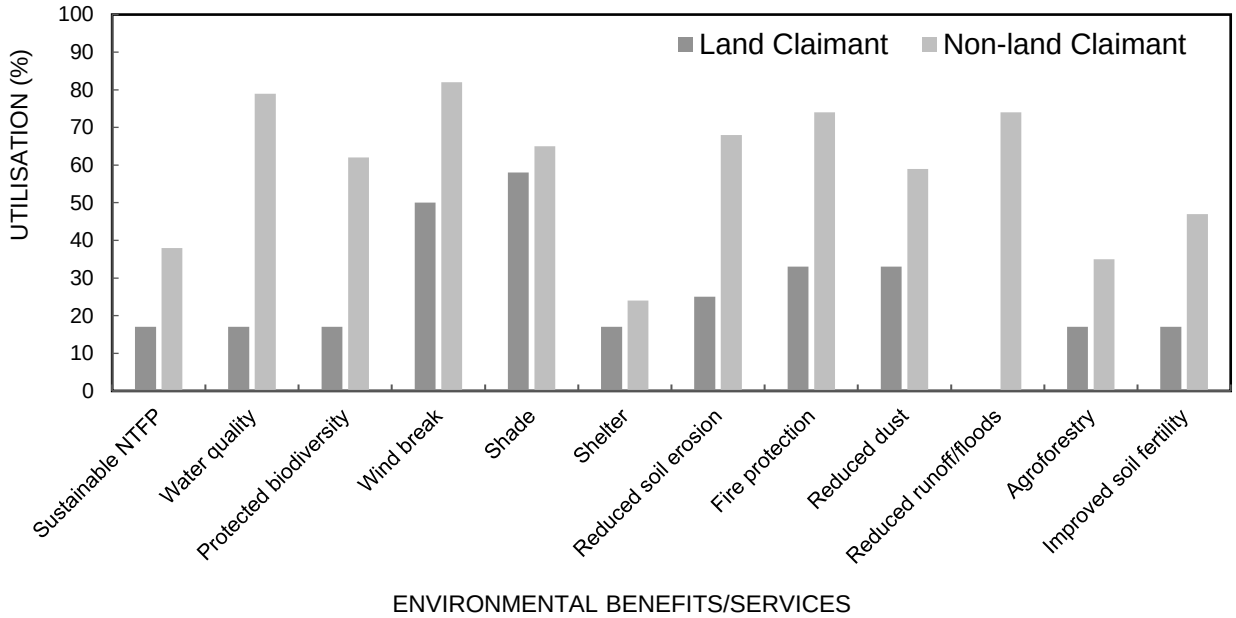


Figure 3.11: Environmental benefit utilisation (%) by land claimant status for communities in Mpumalanga.

There was higher utilisation of environmental benefits by non-land claimants than land claimants.

3.4.1 Sustainable NTFP collection

A third of respondents acknowledged benefiting from the sustained supply of environmental NTFPs, with 45.7% of these collected by males, and 54.3% collected by females. No relationship was found between gender and the timing of collection *($p = 0.193; n = 46$)*, however it was noted that the majority (47.4%) was collected on a monthly basis as opposed to weekly (22.8%), or daily (29.9%). Furthermore, 79.2% of those respondents making use of the sustainable supply of environmental NTFPs, indicated this benefit as being of high importance to their household.

3.4.2 Improved water quality

Sixty-three percent of respondents experienced improved water quality due to the ecological functioning of forests, of which 47.8% experienced this benefit on a daily basis. Although this benefit was experienced similarly by males and females (48.4% versus 51.6% respectively), a weakly significant relationship was noted *($p = 0.080; n = 28$)* for gender and utilisation. The importance of this benefit for households was considered high (92.9%) (*$p = 0.009; n = 46$*), with no respondents citing it as being of low importance.

Although weakly significant (*$p = 0.073; n = 46$*), this benefit was experienced by 17% of land claimants in contrast to 79% of non-land claimants. This forest provisioning ecosystem service (FPES) was cited, by the majority of respondents (34.8%), as the priority environmental benefit from the forest.

3.4.3 Protected biodiversity

Overall, half the respondents experienced improved biodiversity (as a consequence of conservation practices and improved forest management), of which 34.8% experienced this benefit on a daily basis. No relationship *($p = 0.157; n = 46$)* was found between gender and the utilization of the protected biodiversity. The benefit of protected biodiversity was obtained almost equally by males (52.7%) and females (47.3%). Although 86.3% of those utilising this benefit cited it as being of high importance to their household, no relationship *($p = 0.494; n = 46$)* was found in their gender and this ascribed importance.

Furthermore, weakly significant relationships were found between the land claimant status of those experiencing this benefit when compared to the utilisation (*$p = 0.055; n = 46$)*, nor the perceived importance at a household level (*$p = 0.091; n = 46$)*.

3.4.4 Wind break and dust reduction

Seventy-three percent (73.9%) of respondents benefited from the wind break function provided by forest stands through protection of their household, crops and livestock, with 84.4% of these indicting this benefit as being of high importance to their households. No relationship *(p = 0.536; n = 46*) was found in terms of the importance of the dust reduction function of forests and gender, with 65% of respondents benefitting on a daily basis.

Half (52.2%) the respondents benefited from reduced exposure to dust through the filtration properties of forests surrounding their households and communities, of which 95.8% did so daily. Most (83.3%) of those benefiting, indicated that it was of high importance to their household. No relationship was found in terms of land claimant status and those experiencing this benefit (*p = 0*.427*; n = 46)*, nor its importance at a household level (*p = 0*.230*; n = 46)*.

3.4.5 Shade and shelter

Sixty-three percent of respondents benefited from the forests providing shade for their household, crops and livestock, with 79.3% thereof benefiting on a daily basis. With a 5% difference in the gender utilisation of this benefit no relationship was noted *(p = 0.135; n = 29*). Furthermore, no relationship *(p = 0.945; n = 46*) was found between gender and the ascribed importance, with 71.4% of respondents indicating it was of high importance to their household.

In contrast, only 21.7% of respondents cited the shelter for livestock provided by forests as a benefit, although 90% utilised this benefit on a daily basis. Most of the respondents indicated that shade was of higher importance (71.4%) than shelter (19.6%). No relationship was found between land claimant status and utilisation of this benefit (*p = 0.300; n = 29)*, nor in the ascribed level of importance for households (*p = 0*.621*; n = 46)*.

3.4.6 Soil erosion and fertility

Both the prevention of soil erosion through stabilisation by the tree rooting system, and the improvement of soil fertility through the deposition of organic material, were benefits cited by respondents, with an 11.2% difference in utilisation between the two ecosystem services (ESs). Although eighty percent of respondents benefited from these two ESs on a daily basis, no relationship *(p = 0.233; n = 46*) was found in terms of gender distribution and the utilisation thereof.

Eighty-eight percent of respondents benefiting from improved soil fertility cited it as being of high importance to their household, with a similar number (84%) citing protection from soil erosion as being of high importance. A weakly significant relationship was found between land claimant status and those benefitting from improved soil protection (*p = 0.076; n = 46)*, however no relationship was found in terms of its importance (*p = 0*.112*; n = 46)* or the land claimant status of the beneficiary.

3.4.7 Runoff/flood protection

Reduced runoff through soil protection provided by forests, and thus reduced exposure to floods was cited as a benefit by half (54.3%) the respondents, of which 87.5% indicated that it was of high importance to their household. No relationship was found in terms of gender *(p = 0.155; n = 23*), nor in the ascribed importance *(p = 0.290; n = 46*) of this form of protection. A significant relationship *(p = 0.041; n = 46*) was however found between land claimant status and the utilisation of this forest ecosystem service, wherein no land claimant indicated this FPES as being of benefit to them, compared to three-quarters (74%) of non-land claimants who did.

Understandably, a significant relationship *(p = 0.027; n = 46*) was also found in terms of the importance of this FPES and land claimant status, wherein no land claimant cited this benefit as being of high importance to their household, compared to 62% of non-land claimants who did.

3.4.8 Agroforestry

In the study area it was found that 30.4% of respondents utilisatized forest land for the growing of agricultural crops (being agroforestry), of which 71.4% made use of this benefit daily. Most of the users (93%) indicated that this was of high importance to their household. No relationship *(p = 0.255; n = 46*) was noted in terms of gender and the importance of this benefit, nor in the utilization *(p = 0.427; n = 46*).

Although not significant (*p = 0.128; n = 46),* of interest is the difference in utilization between land claimants and non-land claimants wherein double the amount of non-land claimants made use of this resource compared to land-claimants (35% versus 16%). No relationship was found in land claimant status and the ascribed importance of this benefit at a household level (*p* = 0.457; n = *46)*.

3.4.9 General

Forestry was found to have improved the environment around community dwellers, as was cited by 95.7% of respondents. Eighty-one percent of respondents that benefited indicated that the overall environmental benefits derived were of critical importance for their households. Furthermore, 34.8% indicated that Improved Water Quality was the most important environmental benefit for their households, followed jointly by Improved Grazing and the Wind Break function of forests, both at 13%. Whilst no relationship was found in the land claimant status of respondents and the overall environmental benefits obtained, it was noted that non-land claimants benefited more often from such benefits, largely due to their closer proximity to the forest resource.

Chapter 4: Discussion

This chapter presents a discussion of the social, economic and environmental benefits obtained from the forests which were found to be statistically significant and/or practicably important by virtue of their value for the livelihoods of the rural communities' in the study area. The inherent demographics of the study area are explored at length.

4.1 Demographics

The study area fell within the Mpumalanga Province of South Africa, which has a total population of 4.4 million (Statistics South Africa 2016), a non-urban population of 1.7 million, and a high unemployment rate at 32.9% (DWAF 1996, Mahlangu and Sekgota 2005).

To understand the utilisation patterns and perceived importance of non-timber forest products (NTFPs) and forest provisioning ecosystem services (FPESs) explored in the study area, it is important to understand the demographics of the broader community and that of the individual households. Makoudjoum et al. (2017) found that the socio-demographic characteristics of households, for example the age and gender of the household head, size of the household, ethnicity, were important across Africa (specifically in Ethiopia, Nigeria, Malawi and Kenya). The gender and land claimant status of respondents were found to be central themes throughout this study, influencing utilisation patterns and the importance ascribed to the various forest products and ecosystem services.

4.1.1. Age

The age of respondents was considered an important demographic factor of the study area, especially that of the household heads and that of the youth. Although the age of the household heads was found to range between 20 and 82 years old, with an average age of 48.6 years, only a quarter were found to be youth (18 to 35 years). This is comparable to a similar study in Ethiopia by Makoudjoum et al. (2017) which found that household heads were aged between 19 and 73 years, with an average age of 45 years.

Whilst NYDA (2015) and Stats SA (2015) confine the parameters of youth to between ages 15 to 34 years, for the purposes of this study, ages between 18 and 35 years were considered as youth. The age distribution within the Mpumalanga province is skewed towards the younger age group (Tahulela 2016). According to Stats SA (2014), the youth constitutes 37% of the provincial populace, whereas 50% of respondents in this study were below 35. One possible reason for this could be that rural areas often have a low proportion

of old people compared to urban areas due to poorer access to healthcare and thus lower life expectancies (Anríquez and Stloukal 2008).

The provincial median age is 23 years of age (Wazimap 2017), which is lower than what was found in this study (32 years). This was however anticipated, due to the exclusion of the lower age classes (0 to 17 years) in this study for statistical and ethical reasons (being minors). With a larger proportion of the national working class (being 15 to 64 years) between the ages of 15 to 34 years (Stats SA 2015), the importance of this relatively youthful population is emphasised by NYDA (2015), provided the majority are employed. Within Mpumalanga, 62% of people fall within this economically active bracket (Bradshaw et al. 2000). This is considerably lower than the 93.5% of respondents in this study, taking cognisance of the intentional exclusion of the younger age groups. This relatively youthful rural population forms the employment pool for the rurally-based forest industry.

4.1.2. Gender

Many studies globally have reported the gender distribution to vary greatly between comparable study sites, especially amongst household heads. For example, the provincial gender distribution of Mpumalanga Province was 49.3% male versus 50.7% female (Stats SA 2016), which is higher than a 2013 study by Mamba (2013) which found that 43.6% of household heads in communities around Amsterdam were male. These findings are further comparable to studies in Ethiopia where 92% of household heads were male (Makoudjoum et al. 2017), and in Zambia with a 72.5% versus 27.5% distribution between male and female household heads respectively (Kalaba et al. 2012), all of which are comparable to results from this study with a skewed distribution of male to female household heads (73% to 27% respectively).

The gender division amongst respondents overall was found to be 52% male versus 48% female, which was different to a similar Rwandan study by Mutandwa and Kanyanukiga (2017) which found a 66% male versus 34% female division. This gender comparison is supported by a need for equity as captured in the United Nations (UN) Sustainable Development Goals (SDGs), specifically SDG five which seeks gender equality and the empowerment of all women (UN 2015b). In an Ethiopian study by Gobeze et al. (2009), such equity was found to have a positive effect on the participatory management process, with equitable benefit sharing being further supported through the Non-Legally Binding Instrument on All Types of Forests (UN 2007). Hence equity in itself is increasingly considered as a major benefit (UNFAO 2014).

Whilst data on forest benefits and gender on a global scale is limited (UNFAO 2014), a study by Fonjong (2008) found that women collect more forest benefits/products than men, which is supported by similar studies including DAFF (2009) and UNFAO (2013). A CIFOR PEN study found that although both men and women predominantly collect for subsistence purposes (PEN 2017), the global comparative collection percentage for men to women is 32% versus 35%, respectively. Furthermore, a study by Adhikari et al. (2004) stated that female-headed households were more likely to depend on forest resources than their male counterparts.

A further study by the CIFOR PEN however concurred with the findings of this study in that the collection of forest products was fairly similar between males and females (**Figure 3.6, p50**), yet there exists a clear gender specific preference for different types of forest products (UNFAO 2016), which further concurs with a South African study by Cocks et al. (2008).

This gender differentiation by forest product collected (**Table 3.10**) was also found in the East Usambaras of Tanzania during the 1995 study by Woodcock (1995) who found that gender was central to the collection of forest products in all households. Specific products were collected solely by women (fuelwood and vegetables), whilst men were responsible for other forest products, including thatch, building materials, and twine. It was further found that hunting, honey and medicinal plant collection was by experienced men, specialists in their own right (ibid).

A further study by Angelsen et al. (2011) concurs that both genders actively participate in the collection of forest products, but proposes that a further differentiation exists in the intended utilisation thereof, between collection for subsistence versus cash activities, arguing that women are more involved in subsistence activities rather than cash generating activities. This was supported by UNFAO (2013) and Rocheleau and Edmunds (1997). This study confirmed this argument in that whilst the collection of forest products is relatively equal, except for certain specialised products, no forest product was cited as being sold by women, but rather solely by men, although to a very limited extent (**Figure 3.8, p51**). This limited sale of forest products supports the argument of UNFAO (2010) that such products supplement the livelihoods of forest dependent communities.

Gender was thus found to be a central theme in analysing the forest resource utilisation patterns of rural households, as well as the importance ascribed to the various forest products and ecosystem services.

4.1.3 Education and literacy

The Constitution of South Africa (Act 108 of 1996) guarantees basic education for all (DBE 2016), and whilst the Department of Basic Education claims a 100% educational coverage for the Mpumalanga Province (ibid), a district municipality in which the study falls. Gert Sibande district municipality however recorded a low literacy level in 2010 of 64.9%, which was still slightly below the provincial average of 66.1% (DF 2013). Although this figure is higher than a similar study by Yemiru et al. (2010) in Ethiopia which found a 31.7% literacy level, it is in contrast with this study which found an 82.6% literacy amongst respondents.

Whilst only 4.3% of respondents to be entirely illiterate, 4.5% of household heads had no formal education, which is significantly below the figures cited by Mamba (2013) who cited an illiteracy rate amongst household heads of 26.4% at Roburnia Plantation (near Amsterdam, Mpumalanga) and 9.1% at Jessivale Plantation (near Warburton, Mpumalanga). Furthermore, the Ethiopian study by Makoudjoum et al. (2017) cited 11% illiteracy.

Whilst it can be argued that the rural literacy rate is impacted on by limited access to schools, the United Nations Population Fund (UNFPA) (2013) claims that the national secondary school Gross Enrolment is relatively high at over 90%. This study however found that 65.2% of respondents had completed secondary schooling, and comparably Wazimap (2017) claimed that 37.5% of people completed matric or higher in the Mpumalanga Province. Furthermore, a similar study in Zambia found that 4.9% of respondents had attained this level of education (Kalaba et al. 2012).

A study by Tahulela (2016) found a higher proportion of females attended schools, which was corroborated by this study which found secondary school attendance to be higher among women at 72.7% versus men at 58.3%. It was found that 23.9% of respondents had completed post matriculation studies (both vocational training and/or university studies), which is supported by Stats SA (2015) which found that few employed youth (21.2%) have tertiary education. The findings of this study are comparable (**Table 4.1**) to studies conducted by Mamba (2013) also in the Mpumalanga province, Makoudjoum et al. (2017) in Ethiopia, and Kalaba et al. (2012) in Zambia.

Table 4.1: Comparison in education levels per geographic area amongst similar studies.

Education levels	Thesis study (%)	Comparable study (%)	Location	Reference
Household heads with primary education	9.1	50 18.2 21.6	Ethiopia Amsterdam Jessievale	Makoudjoum et al. 2017 Mamba 2013 (ibid)
Household heads with secondary education	68.2	39 7.8 5.2	Ethiopia Amsterdam Jessievale	Makoudjoum et al. 2017 Mamba 2013 (ibid)
Respondents with no formal education	2.2	23.4	Zambia	Kalaba et al. 2012
Respondents with primary education	8.7	20.9	Zambia	Kalaba et al. 2012

Individuals with higher levels of education are better positioned to secure access to income generating resources, than those with lower levels of education, which is important for an area with high unemployment (Belcher et al. 2015).

4.1.4 Ethnicity

Crystal (1993) defines ethnicity as "*a shared culture that has a range of distinctive behavioural and possibly linguistic features which are passed on through socialization from one generation to another*". The ethnic distribution amongst respondents (**Table 4.2**) was found to be similar to that of the Mpumalanga provincial statistics provided by Wazimap (2017), except for SiSwazi which was incrementally higher, and IsiNdebele which was notably absent.

Table 4.2: Percentage ethnic distribution amongst respondents compared to province.

Ethnic group	Provincial Statistics (%)	This Study Statistics (%)
SiSwazi	27	41.2
IsiZulu	24	19.6
Xitsonga	10	8.7
IsiNdebele	10	0
Sepedi	9	19.6
Other	19	10.9

A number of international studies have considered the relationship between ethnicity and forest use (Satoshi 2004). In Laos, the Khmu, ethnic Lao, and the Hmong interact and utilise the natural resources in contrasting ways (ibid), and in China the Jinuo people, who traditionally collect NTFPs, exchange these products with the Dai people for rice, salt and weaving cloth, through a barter system known as Laogen (Jieru 2003).

Whilst the varying number of respondents per ethnic group in this study is acknowledged, of importance is how each ethnic group has preferences in terms of the

forest products which they obtain and utilise (**Table 3.3, p39**). The Swazi, Tsonga and Zulu ethnic groups had preference for the widest variety of forest products, but for the Northern Sotho only one NTFP was of high importance (being Medicinal Plants).

Whilst sand mining, reeds, hunting/bush meat, and thatch grass were of less importance than the remaining six forest products, fire wood, fruit and medicinal plants were of the highest importance, which is comparable to findings made by Tahulela (2016). Understanding the utilisation patterns amongst the various ethnic groups will support the development of a model in predicting consumption and maximum sustainable harvest projections.

4.1.5 Location

Three-quarters of poor people in developing countries live in rural areas (Tesfaye 2011, World Bank 2007). This proximity of households to forest resources facilitates the exploitation of forests (Angelsen and Kaimowitz 1999), and thus generation of forest-based income (Babulo et al. 2008, Mamo et al. 2007).

This was also confirmed both in a 1995 study by Woodcock (1995) in the East Usambaras of Tanzania, as well as in this study which found that 44.7% more forest products and services were obtained by those respondents living on, or within one kilometre of the forest, when compared with those living three or more kilometres from the forest. The impact of this increased distance from the forest had a negative impact when comparing the distance to land claimant residences versus that of non-land claimant community members, where only 16.7% of land claimants resided on or within one kilometre of the forest compared to 44.1% of non-land claimants. This trend was still further compounded in that 66.7% of the land claimants live in excess of five kilometres from the forest compared to only 14.7% of non-land claimants. Correspondingly, it was found that overall land claimants obtained markedly fewer benefits from the forest resource when compared to non-land claimant communities, which is important in land settlement negotiations and related models.

4.2. Social benefits

Due to the many social issues prevalent in the rural areas in which commercial forestry operations are conducted in the Mpumalanga Province (Sachs 2004), it is important that the potential social benefits obtained from the forest resource be identified, and their utilisation and perceived importance understood.

Gender was identified (Section 3.1.2) as a central theme throughout this study, influencing the pattern of forest resource utilisation. In terms of the utilisation of social benefits and services provided by the forest industry, males obtained marginally more social benefits than females, which is in contrast to findings by DAFF (2009), Fonjong (2008), and UNFAO (2013), who suggest that females (in general) tend to obtain more forest benefits and services than males. A preference, or differentiation, for different social benefits was however noted between genders (**Figure 4.1**), a finding supported in other studies (Cocks et al. 2008, UNFAO 2016).

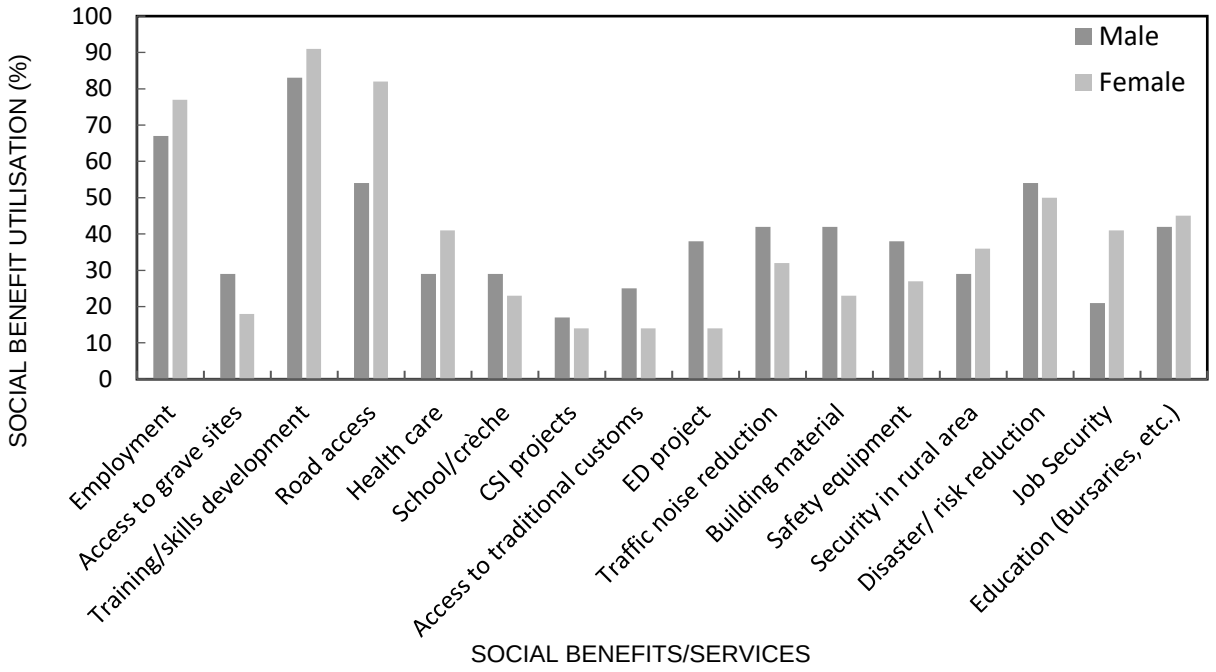


Figure 4.1: Social benefit utilisation (%) by gender for communities in Mpumalanga.

The land claimant *status* of respondents was similarly identified as a central theme throughout this study, influencing the type, frequency of utilisation and the perceived importance, of social products and services obtained from the forest industry (**Figure 3.4**).

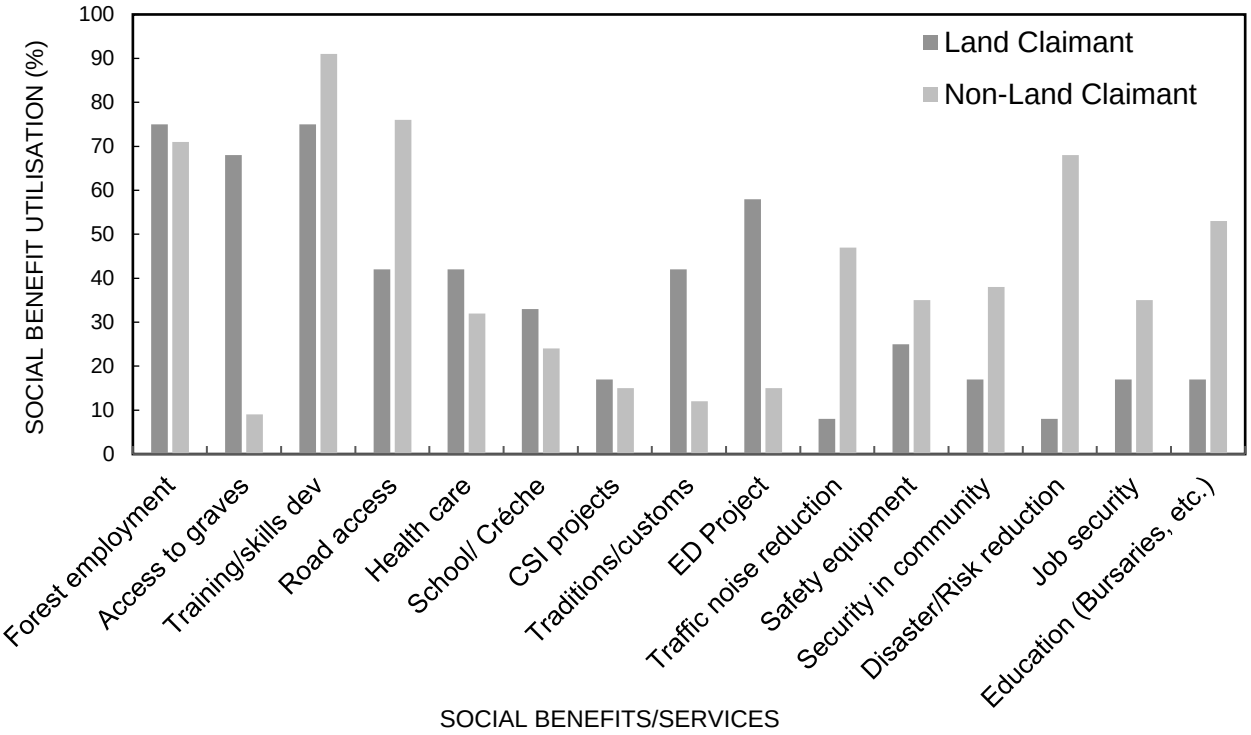


Figure 4.2: Social benefit utilisation (%) by land claimant status for communities in Mpumalanga.

Whilst there was a preference for the utilisation of social benefits and services by land claimants and non-land claimants (**Figure 4.2**), overall, non-land claimants obtained more social benefits than land claimants, which is possibly explained by the near proximity of non-land claimants in relation to the forest resource as compared to land claimants (**Figure 3.2, p39**), which facilitates the exploitation thereof (Angelsen and Kaimowitz 1999).

Other studies suggest numerous social benefits to be obtained from forest resources, including: increased job security; the supply of safety equipment; regular health check-ups; an increase in employment; education; improved infrastructure; and integrated agricultural practises (Mamba 2013, UNFAO 2010b). This study explored a number of such social benefits, which are discussed here below.

Employment

This study identified forest-based employment amongst the rural populace of the study area as being an important benefit, significantly so amongst women and land claimants, with the latter citing this as their primary social benefit from the forest. This forest-based employment directly supported a reduced unemployment rate in the study area, to half that of the national average (26.4%) and a quarter of the provincial rate of 41.1% (Stats SA 2015). Mamba (2013) found that 78% of respondents living around the SAFCOL Jessievale plantation (within the study area) indicated that forestry had provided employment in their community.

One is further encouraged that a third of respondents cited increased job security attributed to forest-based employment in the study area.

This is important since only 37.5% of people are formally employed in the Mpumalanga Province (Wazimap 2017). Krige (1989) explains that unemployment may lead to poverty, the lack of fulfilment and exposure to crime, because employment is a prerequisite to accessing other basic needs (Mahlangu and Sekgota 2005). Letourneau (1987) concurs that employment is important when assessing the value of the forest industry, which is further supported by Evans et al. (2004) who states that where forestry operations provide employment in rural areas, the local people should be given priority. For the success of a Participatory Forest Management (PFM) arrangement, one must however caution against community stakeholders, especially land claimants, being utilised as labour rather than fully-fledged partners and equals in decision-making (Gandji et al. 2017, Ham et al. 2010).

Traditions and customs

In all forest communities, the majority of people know of an area of traditional and spiritual value (Woodcock 1995). The cultural values and functions ascribed to forests are as diverse as the communities living in forests globally, and whilst difficult to quantify, these values are undeniably real (World Bank 2016). In the study area, the protected access to observe and maintain such traditions and customs was acknowledged and utilised as a benefit on a monthly basis by a fifth of respondents.

Chirwa et al. (2017) further state that some forests in Africa are protected as *sacred forests* providing cultural services such as spiritual places of worship and reflection, which was found to be important in the study area, specifically amongst land claimants, where a higher utilisation of access to observe such rites was found compared to non-land claimants (**Table 3.6, p44**).

This higher, and more frequent, utilisation amongst land claimants, as well as the inflated ascribed value (**Table 3.5, p44**), emphasises the importance of the spiritual connection to the forest land. Rahman et al. (2011) state that forests and cultures are compatible, since they have the ability to enhance spiritual wellbeing through creating a bond with nature (Smith 2010), and often forests revive the values and cultural beliefs held dear (Thulela 2016).

Of importance is how land claimants utilised this access to gravesites and to observe customs more frequently than non-land claimants (**Table 3.6, p44**), even though their distance to the forest resource did not favour this tradition. This shows the ascribed value

and importance of these rites to the land claimants, a value which Evans et al. (2004) suggest is often overlooked when large forest tracts are actively managed for production purposes. UNFAO (2008) further states that in Sub-Saharan Africa forest tenure and rights of access to forest resources are often either not clearly defined or entirely non-existent, which results in tenure disputes and deterioration in stakeholder relations.

For a PFM approach to succeed in the study area, a common recognition of the traditional and customary value of the forest needs to be established with respect and protected access to observe such rites.

Education and training

This study explored three modes of education and training provided through the forest industry: School (being crèche, primary and secondary schooling); Training/Skills development (being vocational short skills interventions); and Education (being bursaries). On average, more than half the respondents made use of these benefits, which, as a fundamental human right, are important in the achievement of sustainable socio-economic development (SDG Compass 2015), and by extension SFM, especially in the rural communities in which the forest industry operates. This access to education and training is important in supporting the fourth UN SDG, which emphasises the need for inclusive and equitable access to quality education and opportunities for life-long learning (IFPRI 2015).

The UN, through the 2007 Non-Legally Binding Instrument on All Types of Forests, further sought to promote SFM through education and training. These aims are expressed in the National Policies and Measures for member states, and focus on formal and informal education, training and extension programmes, explicitly for local and indigenous communities (UN 2007).

A PFM approach to forest management provides opportunities for learning and information sharing, and increasing stakeholders' management skills and capacity (Geoghegan 2002). DWAF (2005b) however, suggests that the lack of skilled labour to effectively manage forest resources is often a limiting factor at the community level, which implies that the success of a PFM approach largely depends on the upskilling of the relevant community (ibid). Whilst Temu (2013) argues that technical training was reduced during the 2000's, this study found that the majority (87%) of respondents benefited from vocational short skills interventions offered by the forest industry. This is comparable to a similar study by Holmes (2007) in the Western Cape Province, which cited a 68% user benefit. Importantly however, it was found that land claimants in this study, as potential key stakeholders in future PFM endeavours, received 52.5% less education and training related benefits when

compared to non-land claimants (**Table 3.7, p45**). This may negatively impact negotiations on settlement models and potential future partnerships.

This low realisation of education and training benefits by land claimants was further exacerbated in that 36% more non-land claimants acknowledged receipt of bursaries compared to land claimants (**Table 3.7, p45**), which is seen as a catalyst for economic independence. Although Makoudjoum et al. (2017) concur, claiming that a higher level of education supports Sustainable Forest Management (SFM) by providing alternative income earning opportunities which divert from forest resources exploitation, Holmes (2007) argues that technical and professional forestry training for communities remains low generally. For the success of a PFM arrangement in the study area, a concerted focus on the up-skilling of the land claimant communities is required.

Healthcare

Whilst it has been established that forests contribute directly to human welfare through the provision of various benefits (Vincent and Hartwick 1998), the scope of healthcare benefits provided by forests vary broadly from the yoga practice of Shinrin-yoku (being forest bathing), through medicinal plants and nutrition to healthcare facilities (e.g. clinics) funded by the forest industry. These healthcare benefits were found to be widely utilised in local communities with almost half of the respondents citing a direct cost savings, in terms of money, time and/or effort from the utilisation of these.

Almost all respondents (96.2%) acknowledged and appreciated the calm and peaceful environment created by forests. This notion is supported by Smith (2010) who found that forests enhance spiritual wellbeing through bonding with nature. Studies by the Japanese Ministry of Agriculture, Forestry and Fisheries in 1982, found marked health benefits through experiencing the aesthetics and atmosphere of a forest (Hanson and Frank 2016). This interaction with the forest environment deals with aromatherapy (Li 2010), the inhalation of phytoncides and a decrease in cortisol levels (IUFRO 2008). Although overall non-land claimants, who resided on or closer to the forest land, benefited more from such healthcare facilities/services than land claimants, it was found that the latter utilised forest industry funded clinics ten percent more than the former. The reason for this higher utilisation amongst land claimants is not clear.

The contribution of adequate nutrition to the health of communities is widely acknowledged and is seen as a global public health concern (Beaglehole et al. 2011). Lopez et al. (2006) cite poor nutrition as the single largest risk factor for increased susceptibility to infectious diseases, whilst Black et al. (2013) claim that a major cause of malnutrition as

being poor quality diets, especially those lacking in diversity and micronutrients. Through contributing to balanced diets and nutrition, forests also contribute to food security and rural health (Johnston et al. 2013, UNFAO 1992). This contribution to the diets of rural households is considered an important benefit for local communities (Evans et al. 2004), especially by improving the taste and palatability of otherwise bland and nutritionally poor staple foods (UNFAO 2011). Forest foods, including leaves, roots, tubers, nuts, fruits, mushrooms and honey often supplement subsistence crops, especially during shortages due to adverse weather (Arnold et al. 2011, CIFOR 2014, UNFAO 2014). This study found that respondents utilised the forest resource as a source of numerous foods, including: bush meat; fruits; honey; and vegetable crops (through intercropping practices). It was established that over a quarter of respondents collect forest fruits on a daily basis, and 40% of honey was collected on a daily basis. Some forestry companies contribute directly to the nutrition of the communities by providing their local staff with warm, nutritionally balanced meals daily (Mondi 2011), which in 2011 amounted to 1.8 million meals per annum.

The health of rural forest dependent communities is also subjected to the availability of natural and traditional medicines. Abdel-Azim et al. (2011) claim that the primary healthcare of ca. 80% of the population in developing countries consists almost entirely of traditional medicine practices and herbal medicines. The Institute of Natural Resources (2003) estimates that 80% of the world's population, mostly from developing countries, depend on traditional medicine for primary healthcare. It is further estimated that a quarter of all prescribed medicines contain some ingredient derived from plants (ibid). This study found that a quarter of households collect medicinal plants for household use, with over half citing this benefit as of high importance to their household. This usage is supported by the Institute of Natural Resources (2003) which further estimates that there are 28 million users of medicinal plant products in South Africa. Such access to traditional medicines from the forest constitutes a cost saving in terms of time, effort and money when considering sourcing the pharmaceutical alternatives from the nearest town and pharmacy.

Evans et al. (2004) state that some large plantation developments provide healthcare facilities for their staff and dependants, as with SAFCOL, who in 2014 built two clinics (one within the study area) as part of their wellness drive (SAFCOL 2015). These facilities offer: 24-hour counselling services; full incapacity and diseases management process; HIV/AIDS and other chronic diseases management services (ibid). Given that the Gert Sibande district municipality, in which this study area falls, is regarded as having the second highest prevalence of HIV nationally, estimated to be at 40.5% (Mpumalanga Provincial Aids Council

2015), these facilities provided by the forest industry become increasingly beneficial, especially to employees, dependents and adjacent communities.

Enterprise Development, Corporate Social Investment and Social Economic Development

Within the study area, SAFCOL provided a number of SED projects such as community halls and Early Childhood Development centres, amongst others. A quarter of households indicated utilisation of these projects, which were utilised daily by more than half (57.2%) the users. Furthermore, it was found that a third of households made a cost saving by making use of such SED facilities provided by the forest industry. Such facilities were found to improve the social wellbeing (by improving access to education at a young age) and cohesion (by encouraging community engagements through Joint Community Forums held in SED supplied community halls) of the community.

Furthermore, forest industry supported Enterprise Development projects (e.g. community businesses) within the forestry value chain, providing benefits to a quarter (26.1%) of respondents, with two-thirds benefiting on a daily basis. Of significance was that over half the land claimant respondents utilised forestry-based projects compared to 14.7% of non-land claimants. This is important in fostering relationships with land claimants in terms of land settlement arrangements, as well as in transferring skills in the management of forest operations, which further supports a PFM approach.

Due to pressure from stakeholders, legislation and policy, large corporate forestry companies are increasingly being compelled into committing to developing rural communities adjacent to their plantations (SAFCOL 2015), which is seen as standard for a responsible corporate citizen (Sappi 2010). This is further supported through the BBBEE Act (Act 53 of 2003), the Forest Sector Codes of Good Practice on BBBEE, and the subservient Forest Sector Transformation Charter.

Two distinct fields of Corporate Social Investment (CSI) become apparent, being Forestry Enterprise Development (FED) and Socio-Economic Development (SED). Being defined Forestry Enterprise Development (FED) is "*the concept of using forests (natural and plantation) and forest-based resources as a vehicle for economic growth, employment and socio-economic upliftment that takes people from a subsistence livelihood system into the market economy*" (DWAF 2005d). This usually takes the form of a community-based business. SED is defined as "*monetary or non-monetary contribution implemented for communities, natural persons or groups of natural persons where at least 75% of the beneficiaries are Black people.*" (Broad-Based Black Economic Empowerment Act 53…, 2013). Both models are utilised by forestry corporates for developing local communities.

Road and traffic

Forestry road infrastructure provides access to forests and the adjacent rural communities, and whilst this access is commonly associated with timber extraction, it also provides access for other activities such as recreation, conservation, forest management and protection services (Sessions 2007). The USDA (2001) claims that almost all recreation in forests depends to some degree on road access. In this study it was found that two-thirds of households utilised such forestry roads on a daily basis. More than half the respondents recognised a cost saving in utilising forestry roads, and three-quarters cited this road access as being of high importance to their household.

UNFAO (2014) infers multiple benefits provided for local communities by forests, which is supported by the White Paper on SFM in South Africa (1996), which further states that the forest industry in South Africa needs to urgently pursue wider access to these benefits. This access to forest benefits is cited by DWAF (2004a) as a core component of a PFM approach, with Sessions (2007) suggesting that forest resource utilisation by communities is dependent on the accessibility thereof as provided by such forest road networks.

Whilst a study by Mamba (2013) around Jessievale plantation in Mpumalanga found that local forest communities anticipated improved infrastructure from forests, forest roads also result in increased traffic noise. Peng et al. (2014) however argue that significant noise abatement can be achieved through roadside vegetation, if present in sufficient density and depth, a notion which is supported by Huddart (1990), as well as Fang and Ling (2005). In this study noise abatement benefits were cited by 37% households, of which the majority (82.4%) claimed that it was of high importance to their household.

Lee et al. (2008) suggest that a reduction of up to 9 dB can be achieved with vegetation belts of between 20 and 30 meters in width, whilst Coder (1996) concurs stating that a 7db reduction is achieved per 100 feet (ca. 30m) through the reflection and absorption of sound energy. This reduction is further supported by the white noise created by trees through the leaves and branches moving in the wind (ibid). Tthis type of noise abatement benefit was cited by 37% of households, of which the majority (82.4%) claimed that it was of high importance to their household. This noise abatement function of the forest, together with the dust filtration properties directly contribute to the appreciation of the forest environment and inherent aesthetic value thereof, thereby fostering vested interest amongst communities.

Forest road networks thus provide communities with improved access to their rural residences which facilitates social interaction. Using the Inferential Ranking of the Mean,

forest road network obtained the highest priority in terms of cost saving benefits for communities, and was cited as the third most important social benefit obtained from the forest.

Safety, security and risk

Sustainable development, including SFM, cannot be achieved without peace and security (UN 2015b). DWAF (2010) expands this understanding by stating that for improved productivity within the forest sector the families of workers (communities) require security and a good quality of life. This is also true for the sustainability of PFM arrangements with the rural communities adjacent to the forest resource. This study found that through the provision of patrols by private security contractors to ensure the protection of the biological asset, the majority of households acknowledged that security within their community was improved. This was experienced by three-quarters of households on a daily basis. The importance of this benefit is that the communities appreciate the forest industry, and are thus willing to partner and support the industry, which is a primary requirement for a successful PFM arrangement.

Due to the near proximity of the rural communities to the forest resource, a real risk is experienced in exposure to fires, with vulnerability varying depending on the fuel loading, prevailing vegetation types, the landuse patterns, et cetera (DAFF 2011). This risk is experienced in terms of: the potential for loss of life; injury; property damage; and other economic or environmental impacts (FynbosFire 2016). This study found that more than half of respondents, living on or adjacent to the forest resource, cited fire protection and support services provided by the forest industry as a distinct benefit. This acknowledgement of the importance of the forest industry in maintaining and protecting their livelihoods instils a vested interest in the longevity of the forest resource and industry.

A study conducted by Samran and Akaaraka (1997) in Thailand, however, found that the activities of rural communities, living either in or adjacent to forests, are responsible for most forest fires, whether deliberate or accidental. DAFF (2015b) thus proposes that fire prevention plans should be developed in cooperation and consultation with community leaders, with focus being placed on the potential benefits for the community. DAFF (2011) identifies cooperation among stakeholders as a key element in integrated fire management. Securing the motivation and interest of local communities in the forest, is an important factor in reducing the risk of fires (Project FireFight South East Asia 2002). To achieve this, the

objectives and requirements of communities must also be taken into consideration, such as maintaining ecological diversity and livestock grazing preferences (ibid).

Since forest fires are often as a result of negligence relating to campfires and smoking, charcoal making, the burning of trash, agricultural residues and/or pastures, or when children play with fire (Project FireFight South East Asia 2002), the education of communities in the prevention and suppression of fires is important (FynbosFire 2016). Forest Europe (2010) concludes that since people tend to forget about past fires with time, keeping communities engaged and motivated is important in achieving an integrated fire management approach. It can thus be argued that whilst the communities in the study area experienced a reduced fire risk due to the fire prevention practices of the forest industry, a certain responsibility remains with them in maintaining this benefit through reporting risks and fire events timeously.

4.3. Economic benefits

Eighty percent of the global poor, who live on less than USD1.25 per day, reside in Southern Asia and sub-Saharan Africa (UN 2015a). Plantation forest operations in South Africa most often occur in rural areas characterised by high levels of unemployment and thus poverty, including in the Mpumalanga Province where over half the provincial population live below the poverty line (UNDP 2004). Although DAFF (2009) states that poverty amongst rural communities cannot be overcome through the subsistence use of forest products, contemporary studies emphasise the importance of forest-based income for the livelihoods of such communities (UNFAO 2016). This study found that three-quarters of respondents acknowledged some level of economic benefit obtained from the forest, with many citing this economic benefit as being either high or very high. One third of respondents cited over 80% of their household income being obtained from the forest, a role of forests which is too important to be ignored (Angelsen et al. 2011).

Studies have found that forest activities contributed significantly to reducing poverty (UNFAO 2010), and that by excluding income from forests in the national account will increase poverty incidence by a fifth (Yemiru et al. 2010). This forest income includes: energy; food; timber; ecosystem services; and many NTFPs (Temu 2013), many of which are explored in this study.

Gender was identified (Section 3.1.2) as a central theme throughout this study, impacting on the pattern of forest resource utilisation. In terms of the utilisation of economic benefits and services provided by the forest industry, females obtained more economic benefits than males, which supports findings by DAFF (2009), Fonjong (2008), and UNFAO (2013). A preference, or specialisation, for different economic benefits was noted between genders (**Figure 4.3**), a finding supported in studies such as Cocks et al. (2008) and UNFAO (2016a). Females were found to favour food stuffs including honey, fruits, bush meat, and medicinal plants, whilst males showed preference for thatch grass, building material and reeds.

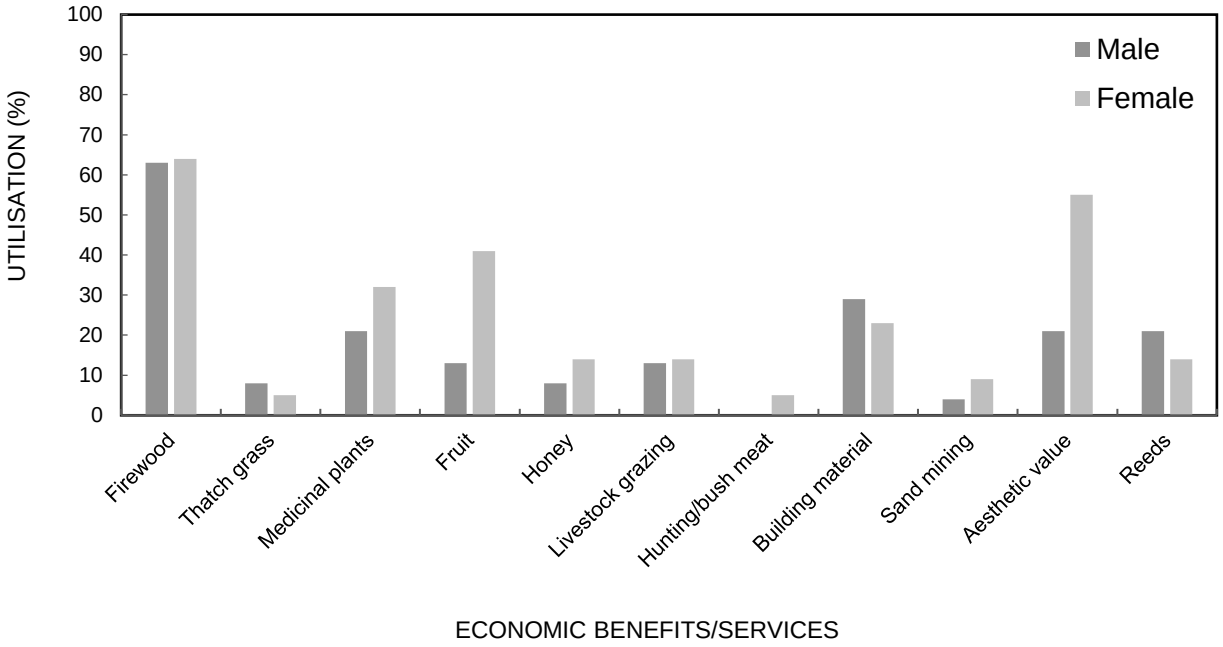


Figure 4.3: Utilisation of economic benefits/services (%) by gender for communities in Mpumalanga.

The land claimant status of respondents was similarly identified as a central theme throughout this study, influencing the type, frequency of utilisation and the perceived importance, of economic products obtained by respondents (**Figure 4.4**).

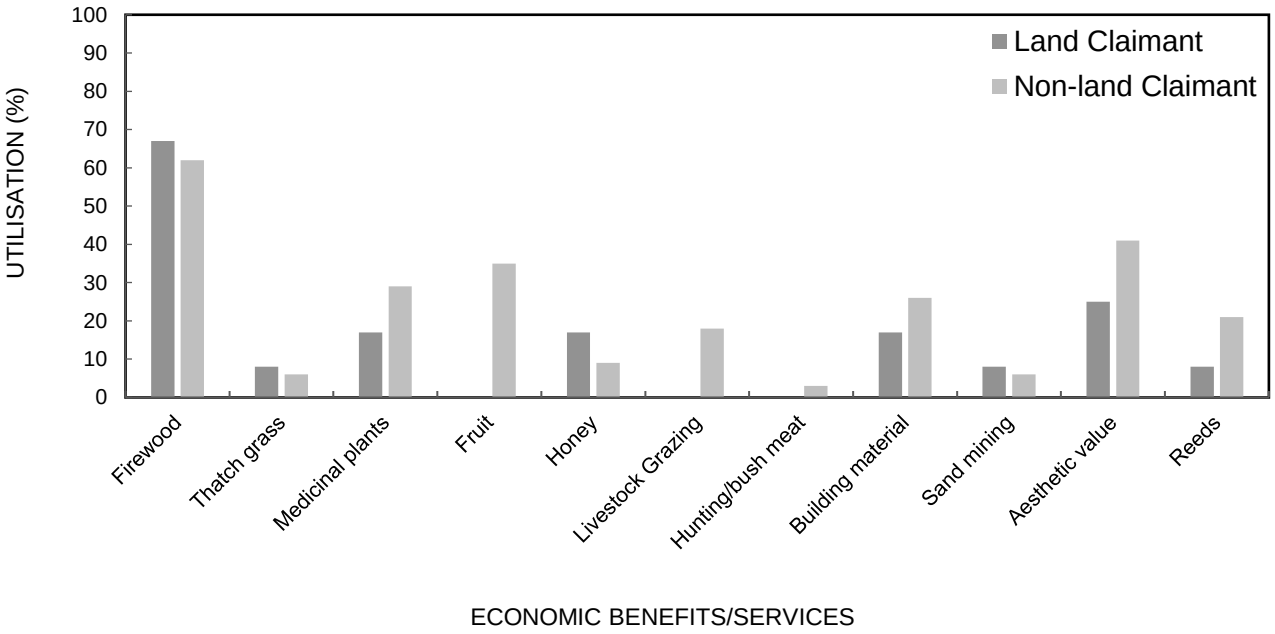


Figure 4.4: Utilisation of economic benefits (%) by land claimant status for communities in Mpumalanga.

Overall, there was a higher utilisation of economic benefits by non-land claimants compared to land claimants, which is possibly explained by the nearer proximity of the former in relation to the forest resource (**Figure 3.2, p39**), which facilitates exploitation

(Angelsen and Kaimowitz 1999). This study explored a number of economic benefits, which are discussed below.

Income Sources

With unemployment amongst respondents similar to the provincial percentage (Provide Project 2009), formal employment income at a household level was limited to: forestry worker; farmer; teacher; civil servant; et cetera. In contrast, informal income through forest products, which is acknowledged as an important feature of forests (Chambers and Leach 1990), was cited by 69.6% of households, contributing up to 80% of gross household income. This is higher than was found in a study in Tanzania by Monela et al. (2001) which reported a 58% contribution to household income in migrant communities of Cameroon.

Similar international studies reported lower figures for the percentage contribution of forest products to the annual income of rural households: Nigeria (30%); Malawi (15%); Ethiopia (27%) (Mutandwa and Kanyanukiga 2017); Southern Malawi (30%); Middle Hills in Nepal (13%) (Yemiru et al. 2010), Zimbabwe (35%) (Cavendish 1999); Canton de Tiwintza, Ecuador up to 50% (UNFAO 2010b); and in the Congo basin between 20 and 25% (Makoudjoum et al. 2017). In Tunisia, a 2015 study shows that 14% of the country's population living in rural areas derives 30 to 40 percent of their income from forests and rangelands (Croitoru et al. 2015). Forest products constitute one of the most important sources of income for rural people in Africa (Acheampong 2003), where the continental average annual income component from forests is 21% (PEN 2017), which is similar to the global average of 22% (UNFAO 2016). This income is most often in the form of NTFPs (**Appendix F**) or Non-Wood Forest Products, with three common products being Medicinal plants, Animal-based, and Plant-based products.

It was further found that the majority of respondents obtained NTFPs to supplement formal income, and for subsistence use within their households, with limited sales being reported (**Figure 3.8, p51**). This enabled them to use their limited cash reserves for other household needs, like school fees and transport costs.

The level of NTFP utilisation depends on a number of factors, including: availability; season of year; and the proximity of households to the forest resource which facilitates exploitation (Angelsen and Kaimowitz 1999). Although the utilisation of NTFPs in the study area is relatively high at an average of 34%, a similar study by Kalaba et al. (2012) in Zambia found comparably higher utilisation rates (**Appendix I**). Whilst the exact reason is unclear, it may be due to higher dependency levels, accessibility and distance to the forest resource of the relevant community.

Although informal income has been estimated to constitute up to 50% of the average annual income of local communities (UNFAO 2010b), it is often difficult to quantify on a local scale, where benefits obtained from the plantation forests are at a subsistence level and are often not included in national statistics (RECOFTC 2008, Temu 2013, UNFAO 2010b). This informal forest income is seen as an important complement to household income (Tesfaye 2011), thereby improving food security in rural communities. Wollenberg (2000) concludes that forest income is an important tool in assessing the wellbeing of forest dwellers.

Non-Timber Forest Products

This study explored 11 NTFPs: fuelwood; thatch grass; medicinal plants; fruit; honey; grazing for livestock; bush meat; building material; sand; aesthetic value; and reeds. Although World Bank (2016) acknowledges the significant income generated by NTFPs (an added annual gross value of USD88 billion), their role is largely underreported (DWAF 1996, Kuyah et al. 2016), and often these benefits obtained by rural communities in the informal forest sector outweigh those in the formal sector. A study by Shackleton et al. (2008) in South Africa found that income from NTFPs elevated the income levels of local rural households to approximately that of the wider community (Yemiru et al. 2010), this was further corroborated by similar studies in Ethiopia (Mamo 2007).

Overall, a third of respondents cited the ability to collect these NTFPs in a sustainable manner from the forest as a benefit they realise, with a quarter of these benefiting from NTFPs on a daily basis. Ros-Tonen and Wiersum (2005) acknowledge that for the millions of forest-dwelling people still depending substantially on NTFPs for subsistence, the sale of NTFPs may be one of the few opportunities they have of earning an income. For example, Gunatilake et al. (1993) estimate that in Sri Lanka the average family income from NTFPs is USD253 per annum. Similarly, Godoy et al. (1993) report that the people of Iquitos, Peru, harvest a value of ca. USD15 per hectare per year in NTFPs (Acheampong 2003).

Acheampong (2003) further stresses the importance of NTFPs in contributing to rural households through increasing incomes, improving diets and combating hunger. Temu (2013) states that the importance of forests for uplifting the continent from poverty especially with regards to energy, food, timber, environmental services and a wide range of NTFPs, was further recognised by the African Union, through the Comprehensive Africa's Agricultural Development Programme (CAADP).

Interestingly, this study found that land claimants sold a portion of the NTFPs collected, whilst non-land claimants collected almost entirely for household subsistence use (**Figure**

3.9, p52). Although the reason for this is unclear, it suggests that land claimants view the forest as a common resource to exploit for economic gain, whilst for non-land claimants, subsistence is more important. Furthermore, male respondents sold a portion of the forest products they collected, whereas no sale was recorded by females for any of the forest products collected (**Table 3.10, p52**). Again the reason is unclear, however in such rural communities the male, especially as household head, is expected to generate an income for the family and household, which may explain this gender bias in the sale of NTFPs.

Fuelwood

Almost two-thirds of respondents collected fuelwood from the forest resource, with the majority being utilised for subsistence purposes, and the remainder (6.9%) sold locally. Chirwa et al. (2017) found that fuelwood is mostly used outside of the formal market, with no accurate consumption statistics recorded. Fuelwood is an important forest product for local communities, with Solberg (1998 as cited in Evans et al. 2004) indicating that fuelwood accounts for over half of global wood harvests, and correspondingly 80% in Africa (Owen et al. 2013, Temu 2013). This dependence on fuelwood is understandably high in Africa, amongst developing countries, where alternative energy sources may not be readily available.

UNFAO (2016) further states that wood is the primary or only energy source for about a third of the world's population, and correspondingly 58% in Africa, 15% in Latin America and 11% in Asia (Krishnaswamy and Hanson 1999). Three-quarters of the energy in sub-Saharan Africa is derived from biomass, with a number of African countries, such as Rwanda, Tanzania, and Uganda, dependant on biomass for over 90% of their total energy supply (Hall 1994). In West Africa (notably Ghana, Me d'lvoire and Liberia) fuelwood consumption is estimated to be twelve times the volume of commercial timber (logs) harvested from the forest (de Graaf and Parren 1995). In Ghana, for example, fuelwood constitutes ca. 70% of the total energy consumption (ibid), or on average 1.37m³ of fuelwood per person annually (Acheampong 2003). Correspondingly, 7.4 million (14.7%) of the South African population are dependent on fuelwood for cooking, which is predicted by the UNFAO to increase over the next few decades (CIFOR 2003) (**Appendix G**).

Although the sale of fuelwood was only recorded amongst a limited number of respondents (6.9%), of interest is that three-quarters were land claimants, which suggests dependence on the forest land for income generation and the exploitation of the common forest resource. Fuelwood constitutes 42% of forest income in Africa compared with 13% in

Latin America (UNFAO 2016). In the Mpumalanga Province, in which the study area falls, 80% of the local rural households use fuelwood as their primary source of energy with a gross national value of ZAR3 billion per annum, or ca. ZAR2 000 per household per annum (DWAF 2005a). Woodcock (1995) found that in Tanzania fuelwood was neither bought nor sold by the communities surveyed, but was utilised entirely for household consumption, which is closely comparable to this study in which the majority of households collecting fuelwood did so for subsistence purposes.

In terms of the collection of fuelwood, this study found that it was collected jointly by both genders on a monthly basis, with 30% being collected solely by women. This is in contrast to the Tanzanian study of Woodcock (1995) which found that fuelwood was collected exclusively by women, on average two to three times per week. The reason for the monthly collection, as opposed to daily or weekly, is presumed to be due to the increased distance of the forest resource from the residence of the land claimants, who constituted three-quarters of those respondents collecting fuelwood.

When considering that in some countries, such as Ghana and Mozambique, families spend from 1.5 to 5 hours each day collecting biomass to use as fuel (Acheampong 2003), communities having access to plantation forests in close proximity to their dwellings is clearly a benefit, one which a third of respondents in this study stated as being of high importance to their household.

Thatch grass

Thatch grass, identified by CIFOR (1996) as an important NTFP in sub-Saharan Africa, is harvested annually in late autumn (Shackleton 2004c). Rural communities utilise the grass to thatch traditional structures such as huts (Makhado et al. 2009, Tewari 2012).

Personal observations within the study area indicated that relatively few houses had thatched roofing, which was confirmed by the survey where less than 10% of respondents collected thatch grass from the forest resource. In contrast, a study by (Cocks 2006) in the Nqusha and Amathole regions of the Eastern Cape Province (South Africa), found the utilisation of thatch grass to range between 3% and 75% of respondents, being collected mainly from the Afromontane Forest biome. Similarly, the results of 14 studies conducted by Shackleton and Shackleton (2004a) across South Africa found that the overall usage of thatch grass by rural households' ranged between 2.6% and 96.7%.

Although no significant relationship was found in the gender of those respondents collecting this NTFP, it was noted that women collected two-thirds overall, and 100% amongst land claimant respondents. This finding was confirmed by Makhado et al. (2009),

stating that thatch grass is harvested by women and girls, and mostly in the dry season. The reason for this gender preference may be due to the non-burdensome nature of the task, and the relatively prevalence of this NTFP in close proximity to local communities and households.

The sale of this NTFP was limited in this study, however Vedeld et al. (2007) propose that grasses and thatch represent a considerable (12%) share of forest environmental income, which was identified together with building material, honey and reeds as the most important cash generating forest products. Although limited, the sale of thatch grass does contribute to the household income derived from the forest resource, and thus the reliance of local communities on the forest for their livelihoods. This dependency should be taken into consideration when planning forest operations, such as the burning of firebreaks which coincides with the season for harvesting this NTFP.

Medicinal plants

In many of the rural areas where commercial plantation forests are grown, traditions and traditional authorities are still recognised. Within these areas, communities are still dependent on forest resources for primary healthcare, through traditional healers and medicinal plant remedies. A quarter of respondents in this study collected medicinal plants for household use. In South Africa 28 million people are dependent on the 300 000 traditional healers and their traditional plant medicines, of which one-third is constituted of tree bark (DAFF 2005a, 2009). Up to 75% of plant material sold as traditional plant medicines in urban markets are forest and savanna species (ibid), with half of the +1 000 species of plants used coming from forests (Bredenkamp and Upfold 2012). It is likely that the healthcare system of South Africa will continue to be underpinned by medicinal plants for a number of years (DAFF 2009).

No sale of medicinal plants was recorded amongst respondents, which is comparable to a study by Woodcock (1995) in Tanzania. This is however in contrast to findings by Acheampong (2003), who found the practice of traditional medicine common and widespread across Africa, with markets selling medicinal plants also common in rural and urban areas. Angelsen et al. (2014) found that the medicinal plant trade accounts for an average of 5.9% of the total forest income across Africa, comparable with a global average of 5.5% of total forest income, and according to DWAF (2005b), 20 000 tonnes of medicinal plants are traded annually in South Africa with an estimated value of ZAR60 million. The reason for no sale in this NTFP amongst respondents is unclear, but may be due to a lack of demand, due to the provision of healthcare facilities by the forest industry.

Fruit

The collection of forest fruits was cited by a quarter of respondents, with over half of these indicating that these NTFPs were of high importance to their households. This importance is better understood when considering that regions of Africa are some of the most food-insecure regions in the world, with the average per capita dietary energy supply substantially less than the minimum healthy requirements (UNFAO 2000). Whilst food availability in Sub-Saharan Africa has increased by 12% over the past two decades (UNFAO 2015b), in 2016 there were 220 million undernourished people in Sub-Saharan Africa (ibid).

Although this study found that only a quarter of households collected forest fruits, a similar Ethiopian study by Yemiru et al. (2010) found that 87% consumed wild vegetables, which is further comparable to a study by Kalapa (2007) in Zambia which found that 97% of households collected indigenous fruit. UNFAO (2011) reports that diets are supplemented with fruits gathered from forests by up to 50 million households in India. Whilst this study found no sale of gathered fruits, this tendency appears common, with Kalapa (2007) citing limited (31%) sale of indigenous fruits, and Bradley (1990) reporting that in Zimbabwe, forest fruits are only sold on a small and localised scale.

Whilst Woodcock (1995) found in his Tanzanian study that the collection of wild edible plants is solely the role of women, this study found that although woman do predominantly collect forest fruits, a number of males also collect this NTFP, albeit half that of women. Campbell (1986) found that in Zimbabwe, primary school children are also major collectors of wild fruits, followed by adult women. Similarly, this study found that females consumed three times the amount of forest fruit as compared to males. The reason may be due to the availability of fruit to women conducting other household chores, such as collecting fuelwood.

Access to these NTFPs is key to the food security and livelihoods of local communities, since many forest fruits and vegetables are high in micronutrients (Arnold et al. 2011), which is important for the dietary quality of people living in near proximity to forests (Rowland et al. 2017).

Honey

The utilisation of honey from the forest resource was limited and cited by only 11% of respondents. Although the role of bees in sustaining forests and forest dependent livelihoods remains poorly understood (UNFAO 2009), globally honey bees are associated with forests

where the flowers of forest trees provide sustenance for honey bees and the trees physically provide shelter for a swarm or bee hive (Hill and Webster 1995). Although beekeeping generates much more than just honey, this is the product that most people first associate with bees, however the maintenance of biodiversity and the pollination of crops are perhaps the most valuable services provided by bees (UNFAO 2009). This is supported by Hartmann (2004) who states that the benefit of bees can be 250 to 300 time higher through pollination of flora, particularly crops such as pulse seeds and vegetables, than compared to their direct products, being honey and wax (Hartmann 2004). This pollination function is seen as important for local communities who practise inter-cropping agroforestry under commercial forests.

This study found that although land claimants rated this NTFP as being of low importance to their households, they sold a portion of the collected honey. This discrepancy is possibly due to the limited volume sold, and thus the negligible impact on household income. Hill and Webster (1995) however suggest that by combining forestry and beekeeping, the landowner receives supplementary income on an annual basis through the honey bee products (e.g. honey, beeswax, et cetera) whilst waiting for the long term forest management objectives and related returns. The welfare of rural households is improved by supplementary income, as well as food and nutritional security (Pima et al. 2016). The study by Woodcock (1995) in Tanzania found that honey is mostly collected from natural hives mainly for domestic consumption, although half is occasionally sold locally. This limited sale was also found in this study where only a fifth of households collecting honey sold a portion thereof.

Due to the dangers associated with collecting honey from hives, men were found to collect the majority, which is comparable to findings by Woodcock (1995) who found that the collection of honey was entirely done by men.

Improved grazing for livestock

The conservation of open grasslands is inherent within South African forestry plantations, including the management of livestock access and grazing pastures, which also results in improved fodder production in terms of quantity and quality. Although the utilisation of access to grazing for livestock was limited amongst respondents, the majority making use of this benefit indicated that it was of high importance to their households. This is important for local communities who value animal husbandry as a tradition, and a status symbol.

Cavendish (2000) and Kamanga et al. (2009) indicated that the practice of grazing for fodder was amongst the most important forest activities among rural households. Although

Angelsen et al. (2014) indicate that fodder utilisation constitutes on average 12.3% of total forest income nationally, and 11.7% globally, this study found it was slightly higher at 17.7% amongst respondents.

The integration between forestry and animal husbandry lends itself to a PFM approach where livestock is introduced onto the forestry land in an arrangement called silvopasture. As a function of agroforestry, silvopasture is defined as "*an agroforestry practice that integrates livestock, forage production, and forestry on the same land management unit.*" (Hamilton 2008).

Clason and Robinson (2000) propose that silvopasture has additional benefits besides the income from livestock, which includes: employment; improving the overall economic performance of the plantation; improving tree diameter by reduced competition; aiding in erosion control especially in young stands; increased property values; and improved aesthetics. In the Mpumalanga province, with an unemployment of 32 percent, the prospect of employment through livestock husbandry is important in securing household income. Thus the improved cooperation between forestry corporates and the local communities is key in creating an effective PFM arrangement.

Although no significance was found between the genders of the respondents utilising this benefit, three-quarters of the utilisation was by males, which may be explained in that animal husbandry has traditionally been considered a male function within rural households.

Hunting/bush meat

Bush meat, which includes mammals, rodents, reptiles, birds, snails, and insects from forests, provides a stable food source for many forest dependent communities (Ntiamoa-Baidu 1997). Whilst only one household reported hunting for bush meat on forestry land, historically this was the sole source of animal protein, however agricultural development, modernisation and urbanisation have reduced dependence on bush meat as a source of food in many parts of the world (ibid). Woodcock (1995) found that communities do not depend on bush meat from hunting as an income source nor as a source of protein, but rather as an occasional supplement. UNFAO (2014), however, state that 1.29 million tonnes of animal-based NTFPs were consumed in Africa in 2011 alone, and Angelsen et al. (2014) found that on average, bush meat forms 9.3% of total forest income across Africa, which is comparable to a global total average of 11.9% of the total forest income. A study published by the UNFAO in 2014, showed that the value of animal-based NTFPs in Africa was USD3.2 billion in 2011, however in this study however, no sale of this NTFP was reported.

Although utilisation was found to be limited amongst respondents, Ntiamoa-Baidu (1997) explains that data on the collection and consumption of bush meat products is limited as the actual volume consumed nor the range of species utilised recorded. Often the animals hunted and collected are consumed by the specific hunter and his/her household, or sold to a neighbour, thus hardly ever reaching local markets, thereby being inadvertently excluded from the national statistics. It is thus possible that the utilisation reported amongst respondents may be underreported.

Building material

In the study area it was found that a quarter of households collected building materials from the forests, which were mainly *eucalyptus* poles. UNFAO (2014) indicates that 2.2 million people in South Africa (4.5% of the population) have homes which are partially constructed from forest products, and that 1.3 billion people, or 18% of the world's population source a portion of their shelter from forests, whilst in Africa this figure is 150 million people (UNFAO 2016). Globally forest products are utilised to a varying degree in the construction of dwellings (**Appendix H**).

Although the majority of those respondents collecting this NTFP utilised it for their own domestic building projects, a limited number sold a portion locally. This sale contributes to their household income and the broader income derived from the forest resource, making this NTFP an important economic benefit. UNFAO (2016a) values the global income from the informal production of forest-based building materials at USD112 million in 2011 (UNFAO 2016), which amounts to a quarter of all forest income globally (Angelsen et al. 2014, UNFAO 2016).

A study by Woodcock (1995) in Tanzania found that the collection of construction poles from the forest was conducted exclusively by male household members. This study however found that almost half the collection of this NTFP was done exclusively by women. The close proximity of the dwellings of respondents to the forest resource, and the relatively small diameter of the products being sourced may explain the higher number of females collecting this NTFP, often in the form of headloads.

Sand mining

Sand is often mined within forest reserves for construction purposes, however utilisation of this NTFP in the study area was limited to less than 10% of respondents, and limited literature exists on the collection patterns (ibid) with which to compare these findings. Whilst

there is potential for negative environmental consequences, including erosion and increased sedimentation of streams, there is the potential for employment opportunities and income generation, which in turn enhances the local economy (Amponsah-Dacosta and Mathada 2017). Whilst the benefit of employment and income generation is important for local communities at a household level, the possibility of disturbing the functionality of the source ecosystem should be considered (Lager 2003). Economic benefits should never outweigh the environmental sustainability and thus the resource longevity.

Aesthetic value

Although UNFAO (2016a) indicatethat studies on forest use amongst rural households of developing countries seldom include the aesthetic value of forests, this study found that more than a third of respondents acknowledged the inherent aesthetic value of forests, with two-thirds appreciating this value on a daily basis. There is concern however amongst more urban communities who contend that plantation forestry includes clear-felling and re-establishment, which alters the visual quality and character of a natural landscape whilst creating features with strong visual dominance (FSA 2017). The Sustainable Forestry Initiative (SFI) Programme therefore requires participants to have policies in place to manage the visual impacts of forest operations (SFI 2010), similar to Criterion 5.6.7 of the PEFC standards.

DWAF (2004b) concludes that aesthetic landscape values, amongst other benefits, are increasingly being recognised within the international forest policy debate as tangible benefits offered by plantation forests. This aesthetic value of forests is important for communities in providing a calming environment, which lends itself to the concept of forest bathing (Hanson and Frank 2016), which reduces stress levels and improves the quality of life (Coder 1996).

Reeds

Reeds were collected from the forest resource by less than a fifth of respondents, the majority of which utilised it for their own households, with limited sale thereof being reported. Shackleton (2005) indicates that whilst this NTFP is largely collected from around the forest resource for subsistence, reeds are occasionally sold as a raw product, predominantly in the manufacturing of handcrafts for sale locally (DWAF 2005c, Woodcock 1995), and at agricultural markets (Arnold 1994). Common handcrafts produced from reeds include: floor mats; brooms; hand fans; baskets'; food coverings; and wall hangings (ibid). Although little

information is available on production for local markets (Kepe 2002), in 2000 Shackleton and Shackleton (2000) stated that the demand for woven reed mats in the Bushbuckridge area of the Mpumalanga Province alone was roughly 70 000 to 100 000 mats per annum. This NTFP thus forms an important supplemental income for community households who sell a portion of what they collect.

Although little research has been undertaken to understand who these weavers are (Shackleton 2005), or the importance as an economic benefit and income source, this study found that three-quarters of reeds are collected by women, and a third of those collecting this NTFP cited it as being of high importance to their household. Furthermore, sale of this product was only recorded amongst land claimants, with non-land claimants collecting solely for household use. This NTFP is thus seen as an income source to a limited number of respondents, but also as a source of household needs/furniture. The long term impact of continuous collection of reeds from riparian zones needs to be considered for potential negative environmental impacts and thus the sustainability thereof.

Cost saving

The forest industry provides numerous infrastructure, amenities and other benefits to local communities, with these benefits having saved land claimants and rural community members what is considered “an opportunity cost” in terms of time, money and/or effort. This study found that acknowledgement of this cost saving ranged from 23.9% (for the utilisation of managed open grassland) to 54% (for the utilisation of forest road networks). Cavendish (2000) and Shackleton and Shackleton (2004a) propose that the relative magnitude of this cost saving is greater for poorer households, due to the reduced total income sources and sizes of poorer households. Cost saving benefits were found by Sunderlin et al. (2008) to make an important contribution in reducing poverty and improving the quality of life for rural households. All forest amenities were cited as being of high importance to local households by varying a percentage of respondents (**Table 3.11, p57**), ranging from 13.3% (for the provision of a community hall) to 60% (for the provision and utilisation of the forest road network).

Two models explaining the utilisation of forest resources for financial security exist, namely a cost saving, or a safety-net function (Shackleton and Shackleton 2004a). Cost saving is where the collection of forest benefits (for example fuelwood for energy needs, medicinal plants, food, building materials) allows for scarce cash resources to be used to secure additional household needs such as paying school fees. Forests as a safety net allow rural communities, especially poor and landless families to utilize forest resources as a “call

account” during periods of unanticipated and exceptional need, such as the death or retrenchment of a household member, or natural disasters. During these periods, the protected forest resource is harvested/collected and sold so as to supply the need (Angelsen et al. 2011, Arnold 2002, CIFOR 2003, DAFF 2009, Evans et al. 2004, Geldenhuys et al. 2011, Hogarth 2014, McSweeney 2004, Tesfaye 2011, Shackleton 2005, Shackleton et al. 2007, Wunder et al. 2014)

Shackleton (2004c) proposes that, since the financial security provided by a forest resources has a national impact, the government has a vested interest in ensuring the sustainable supply and utilisation of the forest resource until it has the capacity to provide such services independently. It can thus be argued that the sustainable management of the forest resource, and specifically a PFM approach, has the ability to save local communities opportunity costs, and thus improve their socio-economic welfare.

4.4. Environmental benefits

The prominence of socio-economic benefits provided by forests means that fewer environmental benefits are either unrecognised and/or underreported. However, environmental benefits are important for the provision of basic human needs, and should receive the same recognition as the socio-economic benefits.

Gender, identified as a central theme throughout this study (Section 3.1.2), impacted on the pattern of forest resource utilisation, including the realisation of environmental benefits. Excepting for the protection of biodiversity, females recognised and utilised all the other environmental benefits more than males (**Figure 4.5**), similar to the findings reported by DAFF (2009), Fonjong (2008), and UNFAO (2013).

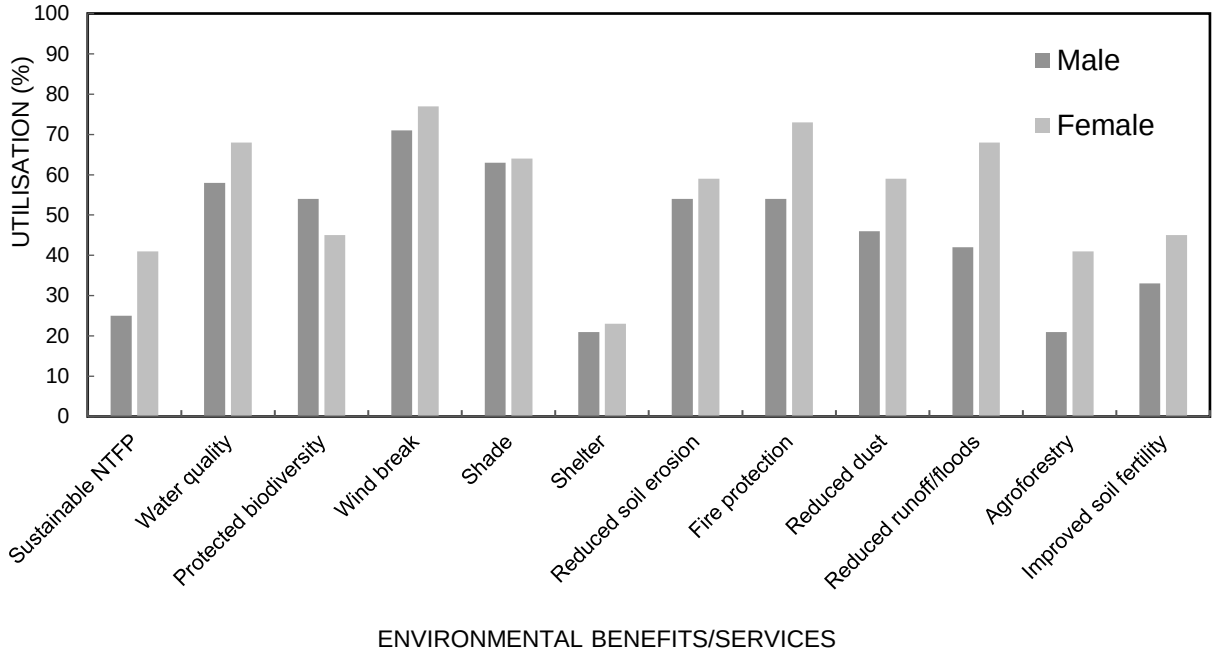


Figure 4.5: Environmental benefit utilisation (%) by gender for communities in Mpumalanga.

The land claimant status of respondents was identified as the second central theme throughout this study. A clear distinction was found in terms of the utilisation of environmental benefits when comparing land claimants with non-land claimants (**Figure 4.6**), with higher utilisation cited amongst the latter, presumably due to their close proximity to the forest resource when compared to land claimants (**Figure 3.2, p39**) (Angelsen and Kaimowitz 1999).

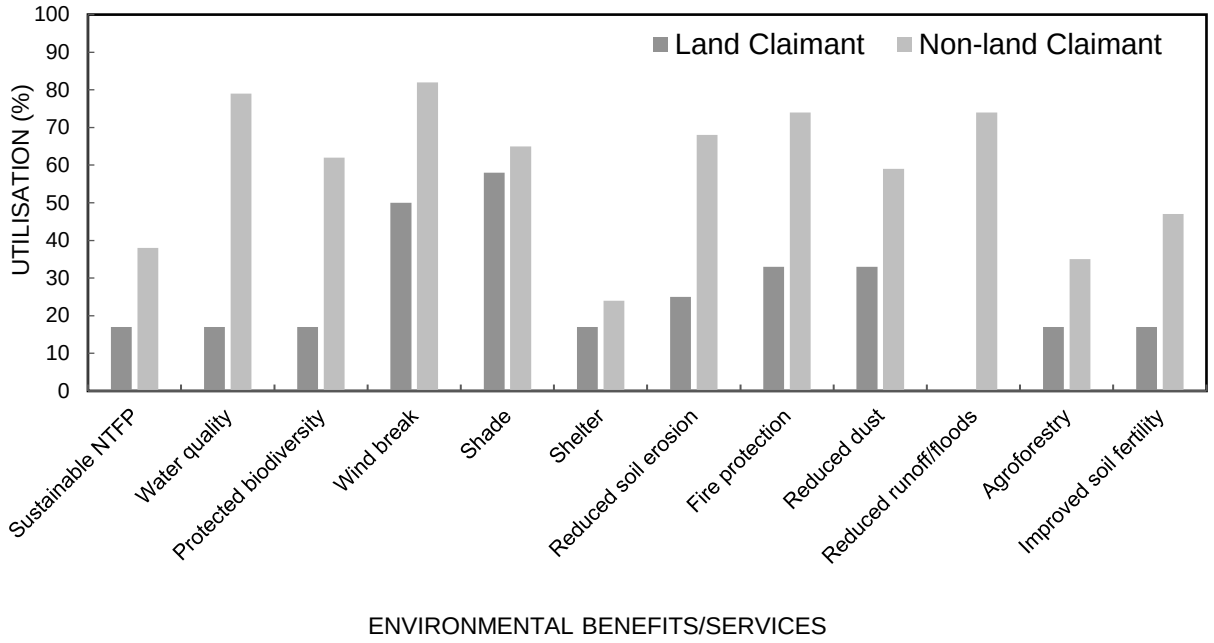


Figure 4.6: Environmental benefit utilisation (%) by land claimant status for communities in Mpumalanga.

Twelve environmental benefits and forest provisioning ecosystem services (FPESs) were identified in this study, and are discussed here below.

Sustainable NTFP collection

Within the study area, one-third of respondents benefitted from environmental NTFPs, with three-quarters indicating that these were of high importance to their households. Although difficult to estimate accurately, World Bank (2002) suggests that between 1.2 and 1.5 billion people (or around 20% of the global population) are dependent on forests to varying degrees. Neumann and Hirsh (2000) explain that NTFPs are considered to be more 'pro-poor', as they assume a more critical role in the livelihood strategies of the rural poor.

Whilst UNFAO (2011) proposes that the harvesting of NTFPs must be managed and regulated in order to be sustainable, Phiri et al. (2012) found that the lack of active local community participation in forest management generally results in negative attitudes towards forest conservation, which may to the uncontrolled exploitation of the forest resource (Gandji et al. 2017). According to PEN (2017) a shared forest resource base often degrades over time largely due to mismanagement and *the tragedy of the commons.*

Common NTFPs and FPESs resources are likely to be overexploited if not managed effectively, but with many rural communities' dependent on forest resources for their livelihoods, the sustainable use and management thereof becomes critical. One of the greatest challenges facing the forest industry in this regard, is balancing the need for poverty

alleviation and socio-economic development in local rural communities with that of forest conservation, so as to ensure a sustainable supply of forest products for subsistence and livelihood use, whilst maintaining the ecological integrity of the source ecosystem.

Chirwa et al. (2017) suggest that the private sector has a critical role to play in the governance and management of NTFP and FPES resource utilisation through the establishment of responsible relations with local communities. PFM potentially stabilizes use-patterns amongst communities (prevents overuse), thereby improving the quality of the forest resources, and ensures the sustained supply of benefits (Geoghegan 2002)

The most common FPESs found in the study area are explored individually below, however based on the utilisation thereof, it is evident that the protection and sustainable supply thereof is a distinct benefit to the respondents in the study area.

Improved water quality

South Africa is a water-scarce country, with a reliable supply of potable water affected by increased demand, limited seasonal rainfall and degraded catchments. Access to a supply of high quality water is therefore seen as a distinct benefit amongst local communities, with two-thirds of respondents in this study experiencing improved water quality (rivers/streams/dams) due to the ecological functioning of forests. For water obtained from natural sources, planted forests within a catchment area can improve water quality through recycling, filtering and fixing pollutants (Dyck 2003).

With only 29% of households in the Mpumalanga province having access to high quality piped water inside their homes (Statistics South Africa 2016), it is understandable that 92% of users in the study area indicated that the benefit of improved water quality provided by forests was of high importance to their household.

Although this FPES was experienced equally by bother genders, of interest was the five times more non-land claimants who cited this benefit as being of high importance compared to land claimants, presumably due to their close proximity to the forest resource (**Figure 3.2, p39**). Overall, this FPES was cited as the priority environmental benefit for respondents.

Protected biodiversity

Well managed forests have the ability to maintain, or improve biodiversity, with studies showing that plantation forests have a catalytic effect on the regeneration of indigenous woody species in the understorey (Chamshama and Nwonwu 2004). There is also a direct

relationship between the increasing maturity of a forest stand and the increase in the diversity of fauna and flora present. For example, a study by the European Commission (2008) found that fields within a forested landscape, contained 91% more grassland species as opposed to fields in an open landscape.

Half the respondents in this study experienced improved biodiversity as a consequence of conservation practices and improved forest management. Dyck (2003) argues that long-rotation exotic plantation also enhance the ecological values of natural forests due to a reduction in deforestation. Within the study area ca. 90% of respondents cited the protection of forest biodiversity through SFM practices as being of high importance to their households, providing the local rural communities with numerous NTFPs and FPESs, which amount to food security and cost savings. The benefit of access to protected biodiversity was utilised by a third of respondents on a daily basis, which displayed the value of the forest resource to the local communities. This is especially important in South Africa, which is rated third among the countries in the world richest in biological diversity, where the Forest biome has the greatest plant species diversity per unit area of all biomes and is thus paramount in contributing towards national conservation targets (DAFF 2009).

Windbreak and dust protection

For communities living adjacent to forests, the protection provided by the trees from winds and adverse weather is beneficial. This study found that three-quarters of respondents benefited from the windbreak function provided by forest stands through protection for their household, crops and livestock. The primary function of a windbreak is to reduce the velocity of wind, although additional benefits can include: enhanced crop yield; protection of soil from wind erosion; shelter for livestock and crops; capture of water runoff and nutrients; filtration and the reduction of dust pollution; control of unsavoury odours; screening of unsightly areas; provision of corridors and habitat for wildlife; and a reduction in noise pollution (Chen et al. 2015), Gold et al. 2015, Evans et al. 2004, Rai and Panda 2014, Chen et al. 2017, Zhang et al. 2017). These benefits for livestock husbandry were experienced daily by respondents who graze their livestock on or adjacent to forested land.

The majority of respondents cited benefits of forest windbreaks as being of high importance to their households and broader community, with two-thirds benefiting from this windbreak function on a daily basis.

This study further found that half the respondents acknowledged benefiting from reduced exposure to dust through the filtration properties of forests surrounding their households and communities. According to Parzych et al. (2017), coniferous species absorb

35% more components from the air than broadleaved trees due to a larger surface area of the needles. With the majority of communities in the study area living adjacent to gravel forest roads, but within pine plantations, this heightened wind break and dust filtration function was widely acknowledged and appreciated on a daily basis by respondents. It is important to acknowledge that both these benefits reach beyond the dwellings alone, but also include the protection of agroforestry crops and livestock, and thus the livelihood strategies of these communities.

Shade and Shelter

Related to the provision of a windbreak function, plantation forests also provide shelter for agricultural crops (intercropping), livestock and human habitation (Evans et al. 2004). Besides for agricultural crops, the shelter function of forests extends to livestock husbandry, where forests provide climate-related protection for livestock, especially for the young animals during winter (Gold et al. 2015). Although the use of the shelter function of forests was cited by only a fifth of respondents, many actively engaged in agroforestry, subsistence crop production, and traditional livestock husbandry, for which protection was provided by the forests. The importance of shelter and shade for livestock husbandry has been confirmed by Reid (2009), who found that the reduction of wind velocity improves the general health of livestock herds, resulting in better production by increasing feed efficiency and weight gains, increasing milk production and improving the mortality rate amongst new-borns (Gold et al. 2015). This benefit is thus important for supporting the livelihood strategies and food security of rural communities.

Two-thirds of respondents further cited shade provided by the forest for their livestock, crops, and household as a distinct benefit they utilise, with the majority utilising the shade daily. Mead (2013) explains that, besides the utilisation of shade by community members during the hot summer months, shade provided by forests also keeps the livestock cool thereby reducing stress. In communities with a strong animal husbandry tradition, as in the study area, understandably the benefit of shade, and shelter, was cited is being of high importance to the rural households by the majority of respondents.

Soil erosion and fertility

Forests provide benefits around soil protection through the reduction in surface wind and water runoff velocity, thereby reducing the erosion potential. This is critical since South Africa has limited arable land, and projections suggest that 30% of rain-fed arable land in

developing countries will be lost due to soil erosion and degradation (Evans et al. 2004). For rural communities dependant on subsistence agriculture for food security, the prevention of soil erosion and improved soil fertility as provided by forests are important benefits, as cited by the majority of respondents in this study.

This protective function of trees on soils was seen in a study in Kenya which found that sediment from agricultural land eroded annually about 50 times faster when compared to forest land (Evans et al. 2004). Tree roots, through their soil binding properties, provide soil stability by preventing wind and water erosion (Bredenkamp and Upfold 2012), as well as a reduction in damage due to livestock trampling, which is of particular importance in the study area due to the animal husbandry tradition of the local communities.

This study found that 88% of respondents benefited from improved soil fertility, through the positive effects of trees. This improved soil fertility was cited as being of high importance to the respondent communities living on, or adjacent to, forests in the study area, especially by those who engaged in dryland crop production and intercropping activities (agroforestry). Thus plantations indirectly support the food security, income generation and the social wellbeing of these communities.

Runoff/flood protection

Besides the protection provided by forests from wind erosion, forests also form a barrier between the falling rain and the ground beneath, which intercepts a significant amount of rainfall, thereby reducing the rain drop impact on the soil and thus the potential for severe soil erosion (Evans et al. 2004). Over half the respondents of this study cited reduced runoff, and reduced exposure to floods, as a benefit they obtained from the forest.

Whilst exotic plantation species may have a relatively low interception rate, at under 25% for *Pinus* spp. (Bruijnzeel 1997), and between 10 and 23% for *Eucalyptus* spp. (Calder 2002), rainfall intensity at the ground surface is reduced by a forest over-storey (Evans et al. 2004). The reduced risk of flooding (and related damage), was regarded as being of high importance by respondents of the study (87.5%). In rural communities, with numerous social issues, access to arable, fertile land for subsistence agriculture is a distinct benefit, and thus the protection of the top soil from erosion is key. Interestingly, due to the increased distance of the land claimant community from the forest land (**Figure 3.2, p39**), land claimants cited no benefit nor importance for this FPES, compared to three-quarters of non-land claimants who did. It is thus a case-in-point of how near proximity facilitates the exploitation of forest resources as argued by Angelsen and Kaimowitz (1999). This finding is important in

displaying how the land claimant groups are excluded, possibly unintentionally, from access to many FPESs and NTFPs due to their distance from the forest resource.

Agroforestry

For the rural poor, such as those living within commercial forestry areas in South Africa, seasonal fluctuations in terms of access to food still occurs (IFPRI 2015), with stability in supply obtained through supplementary forest food products. Many of the benefits obtained from forests are further enhanced when integrated with agriculture through practices such as agroforestry. Although the utilisation of forest land for subsistence crops was cited by a third of respondents, it was considered of high importance by over 90% of these community members. Evans et al. (2004) argue that often the forest industry is obliged to utilise land considered of little or no agricultural value, however agroforestry when practiced as an innovative participatory approach, addresses rural food security (Ahlbäck 1995), whilst also encouraging good forest stewardship, increased productivity and financial returns (Garret et al. 2004).

Although utilisation of forest land for agricultural crops was limited amongst respondents (30.4%), Mamba (2013) found that the forest resource provided food security to 27.3% of respondents in the Mpumalanga province. Furthermore, Angelsen et al. (2014) state that agroforestry, which is a common and traditional practice throughout Africa (Temu 2013), accounts for an average of 32.2% of the total forest income, which is comparable to the global average of 28.7%. Food security for forest dependent communities is not limited to agroforestry, but includes other forest food products such as: mushrooms; honey; fruits; roots and tubers; vegetables; and bush meat, amongst others, many of which were obtained by respondents of this study.

Forestry land was utilised for subsistence agriculture by twice as many non-land claimants as land claimants, which reinforces distance as the primary reason why a limited number of land claimants obtained FPESs and NTFPs from the forest resource (**Figure 3.2, p39**). Besides the benefits of food security for the communities within the study area (mostly non-land claimants), Schroth and McNeely (2001) propose benefits for the environment in that the introduction of agricultural crops reduces the pressure on forests through the overexploitation of NTFPs, thereby increasing species diversity and protecting threatened and endangered species and ecosystems.

4.5 Integration

There is a lack of active community (specifically land claimant) participation in the management of commercial forests in the South African commercial forest industry. This is especially important within the state-owned SAFCOL plantation forests, where participatory practices should be considered the norm. Through the endorsement of relevant legislation, the forest industry has been under increasing pressure from government to transform through the active participation of previously disadvantaged Individuals, specifically land claimants, in forest operations. This needs to occur over the full forestry value chain from ownership to forest operations management.

This transformation will result in a shift from corporate dominance and community exclusion, to active participatory/joint forest management, which is in line with the Forest Sector Transformation Charter. These strategic partnership models have the potential to provide longevity and resilience to the forest sector post-transfer of the claimed land, provided the relevant land claimant communities understand the potential benefits to be realised through participation (Clarke 2007). Identifying and quantifying potential benefits such that they can be incorporated into the proposed participatory management models is the basis of this study.

Sustainability, in the broad sense, encompasses the potential social, economic and environmental impacts of forest management (Evans et al. 2004), and includes a number of additional benefits. These benefits, which have been discussed individually, have the ability to improve the social well-being, economic independence and the quality of environmental services obtained by the relevant communities.

To achieve sustainable forest management, a collaborative approach is required where all stakeholders participate actively, according to clearly defined roles and responsibilities, as expressed in PFM. This is particularly important in terms of identifying forest products and forest provisioning ecosystem services, following which the needs of the land claimant communities can be addressed, which will in turn support transformation in the forest sector through ownership and participatory management. Multiple benefits exist for a PFM approach, some of which include: ensuring land claim settlements occur timeously; ensuring transformation targets are met, thereby improving BBBEE levels and thus maintaining corporate competitive advantage; establishing strong relationships between stakeholders through vested interest, thereby ensuring the longevity of the forest industry post-land transfer; empowering the land claimant communities through employment and education; meeting certification standards, thereby securing market share; and reducing corporate risk in terms of fire and civil unrest, through inclusivity and vested interest.

The empirical value of the data produced through this study will be invaluable in negotiations with the land claimant communities on land settlement agreements and models, joint venture proposals, including PFM, and future land tenure. The data will be utilised by the Land Claims unit of SAFCOL as an integral part of the SAFCOL Land Settlement Model which will be presented to the Board and once adopted will be proposed to land claimant communities as the preferred settlement model. Through these guidelines, the company, and industry will have the advantage of understanding the communities' daily livelihood needs and aspirations in terms of the forest resources and their utilisation of it. This will better position the company/industry to engage, negotiate and structure proposals for participatory management arrangements.

Chapter 5: Conclusion and recommendations

SAFCOL plantation forests in the Mpumalanga Province of South Africa are located largely in rural areas characterised by many social issues, including poor access to key infrastructure (e.g. healthcare), high levels of unemployment, and food insecurity, amongst others. Many of these local communities are dependent on the forest resource to supply, support and/or supplement their livelihood strategies, through the utilisation of non-timber forest products (NTFPs), forest provisioning ecosystem services (FPESs) and infrastructure provided by the forest and the broader forest industry. These benefits, obtained from the forest, are categorised as being social, economic and environmental in nature, which constitute the three primary elements of broad sense sustainability. The objective of this study was to identify those sustainable benefits which are perceived by local communities, especially land claimants, as being important through actively participating in forestry operations and management. The study was conducted through a structured questionnaire, and although the sample size was relatively small, the significance of the findings is invaluable.

The study showed a clear differentiation between gender and land claimant status of respondents obtaining these benefits, where males and females showed preference in the collection of various NTFPs and FPESs, whilst land claimants obtained markedly fewer benefits from the forest due to the increased distance of their domiciles from the forest resource. Although the utilisation of individual benefits was limited (on average cited by a quarter of respondents), of those obtaining these benefits the majority cited them as being of high importance to their households.

The local communities confirmed the positive contribution of forests, and the broader industry, in improving their social wellbeing and quality of life, citing employment, training/skills development and road access as the priority social benefits obtained through the forest resource. Through identifying the social benefits obtained from the forest resource, the community members realised the value of the forest industry in supporting their livelihood strategies and improving community cohesion.

The ability of the forest resource to improve the economic situation of the individual households and the broader community was recognised by the majority of respondents. Forest resources were found to contribute significantly to household income of respondents, through the consumption and sale of NTFPs. Besides the sale of NTFPs, which was limited to land claimants, the economic benefits obtained by respondents included opportunity cost saving through the utilisation of forest industry provided infrastructure, facilities, services

and amenities. Access to, and the utilisation of, the forest road network was regarded as the priority cost saving benefit. This utilisation of amenities provided by the forest industry allowed these rural communities' to utilise their limited cash reserves for other important needs, including school fees, transportation, et cetera.

The study further established that plantation forests provided a number of FPESs for the benefit and utilisation of local communities, with improved water quality being cited as the most important environmental benefit. Through sustainable forest management practices, the implementation of certification standards, and the conservation of indigenous vegetation and grasslands, the plantation forests have improved the environment around local communities, and the quality of ecosystem services obtained. Sustainable access to these ecosystem services is important to the livelihoods of the local communities who, due to a lack of official infrastructure (such as a piped water system), depend on these ecosystem services for basic needs, such as shelter, quality water, et cetera.

The study identified various social, economic and environmental benefits that were acknowledged and obtained from the forest resource by local communities. These finding would contribute to policy development, specifically in the areas of: forest utilisation; Payment for Ecosystem Services; conservation practices; community engagement; and land settlement models. Understanding the community's dependence on the forest resource, by identifying and quantifying the utilisation of benefits obtained, policies can be developed for inclusive and participatory forest management models. Through such inclusivity and vested interest in the sustainable management of the forests, corporate risk is reduced and community/land claimant relationships are reinforced. Participatory Forest Management arrangements are key to ensuring the longevity and resilience of the forest sector post-transfer of claimed land. This study shows that in evaluating forests, it must be recognised that the value of the commercial plantation forests must be extended beyond the production of timber/fibre to include the distinct benefits for the local communities' dependent thereon.

Although the study identified a wide range of benefits obtained from the forest resource, and established utilisation patterns, it was limited by the small sample size. Future studies should include a larger sample size, more representative of the population, such that the precision with regards to significance and magnitude of effect can be detected more readily. Furthermore, the study was not able to establish the quantity of NTFPs obtained, which would be key in establishing annual harvest volumes and patterns, as well as the maximum sustainable yield.

The following recommendations stem from the results of this study:

1. Having established the perceived sustainable benefits of a PFM approach to forest management for community members, it is recommended that further research is conducted in the following areas;
    1.1. Explore additional benefits not included in this study, such as;
        1.1.1. Pollution Reduction;
        1.1.2. Glare Reduction;
        1.1.3. Temperature and Energy Use; and
        1.1.4. Payment for Ecosystem Services (PES) (e.g. carbon sequestration).
    1.2. Quantifying the volume utilisation of benefits obtained from the forest resource, whether NTFPs or FPESs. This includes establishing the maximum sustainable harvest of these benefits;
    1.3. Holmes (2007) identified seven types of participation: passive participation; participation in information giving; participation by consultation; participation for material incentives; functional participation; interactive participation; and self-mobilisation. Using these as a basis, it is evident that research is required into which approach is best suited to deliver maximum benefits to the communities concerned whilst not compromising the production of timber and thus the longevity of the forest industry;
    1.4. Understanding the barriers to establishing PFM arrangements, specifically in the public sector; and
2. Review of current land settlement models to include a PFM option, based on the distinct interest of communities and land claimants.
3. Based on the limited utilisation of the identified forest resources (NTFPs and FPESs), targeted educational interventions should be implemented in the rural forest dependent communities to increase the understanding around the benefits provided by the forest resource.

The empirical value of the data produced through this study will be invaluable in negotiations with land claimant communities on land settlement agreements, joint venture proposals, including participatory forest management, and future land tenure. Such participatory forest management arrangements are key to ensuring the longevity and resilience to the forest sector post-transfer of claimed land.

It can be concluded that participatory forest management, as an inclusive mechanism for the implementation of sustainable forest management, has the potential to provide a wide

range of social, economic and environmental benefits to local communities dependent on the forest resource for the success of their livelihood strategies.

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APPENDIX A

Faculty RTI Committee (**Faculty of Science)** Tel: +27 (0) 41 5042268

E-mail: lynette.roodt@nmmu.ac.za

Ref: H16-SCI-NRM-002

Contact person: Mrs L Roodt Date:

2 September 2016

Dear: Dr K. Little and Leo Long

TITLE OF PROJECT: BENEFITS OF PARTICIPATORY FOREST MANAGEMENT

(PFM) FOR LAND CLAIMANT COMMUNITIES OF CATEGORY A PLANTATIONS IN MPUMALANGA, SOUTH AFRICA

Your above-entitled application was considered and approved by the Sub-Committee for Ethics in the Faculty of Science on 8 August 2016.

The Ethics clearance reference number is **H16-SCI-NRM-002**, and is valid for three years. Please inform the Committee, via your faculty officer, if any changes (particularly in the methodology) occur during this time.

An annual affirmation to the effect that the protocols in use are still those, for which approval was granted, will be required from you. You will be reminded timeously of this responsibility, and will receive the necessary documentation well in advance of any deadline.

We wish you well with the project. Please inform your co-investigators of the outcome, and convey our best wishes.

Yours sincerely

Lynette Roodt

Manager: Faculty Administrator

Faculty of Science

APPENDIX B

HOUSEHOLD SURVEY

SHORT INTRODUCTION:

My name is **Leo Long** and I am a student at Nelson Mandela University, conducting research on: *the potential social, economic and environmental benefits of Participatory Forest Management (PFM) for communities, and specifically land claimants.*

PLEASE NOTE:

- Your contribution will help us assess these potential benefits and guide future stakeholder engagements.
- There is no "right" or "wrong" answer, we simply want to gage your opinions.
- The information you provide is for academic purposes only.
- Your anonymity will be protected at all times.
- Your participation is voluntary and you can withdraw from the research at any time.
- By signing in the relevant space below you provide consent to participate in this survey.

Date:	
Household #:	

Respondent Name and Surname:	
Respondent signature:	
Land Claimant (Y/N):	
Name of Claim:	
Plantation Claimed on:	
# of Households on claim:	

DEMOGRAPHICS

1.01 #	1.02 Name and Surname	1.03 Gender 1. Male 2. Female	1.04 DOB	1.05 Relationship to Household Head 1. Household Head 2. Wife/Husband 3. Son 4. Daughter 5. Son/daughter In-Law 6. Grandchild 7. Parent 8. Brother/Sister 9. Grandparent 10. Others (Specify)	1.06 Marital Status 1. Single 2. Married 3. Divorced 4. Widowed 5. Separated	1.07 Is the family member literate or illiterate? 1. Illiterate 2. Literate 3. Semi-literate	1.08 What is the school level attained by the family member is? 1. Below school age 2. Hasn't graduated from any institution 3. Primary School student/Graduate 4. High School student/Graduate 5. Vocational (Trade) Institution Student/Graduate 6. University Student/Graduate 7. Masters Student/Graduate 8. Doctorate Student/Graduate	1.09 Ethnic Group (isiZulu, isiXhosa, etc.)
1								
2								
3								
4								
5								
6								
7								
8								

1.10 How far is the claimed forest land from your dwelling? (Place X at selection)

0km (live on)	0-1km	1-3km	3-5km	More than 5km

1.11 Is your household represented in the local Joint Community Forum (JCF)?

Yes	No

ECONOMIC

2.01 #	2.02 Has the household member worked in an occupation which brings income in the last 3 months. 1. Yes 2. No	2.03 Timing of employment 1. Full-time/ permanent 2. Seasonally 3. Temporary/ Occasional	2.04 If household member is not working, please mention the reason. 1. Retired 2. Student 3. Housewife (Only for female spouses) 4. Cannot find a job 5. Pregnant 6. So ill that he/she cannot work 7. Too old 8. Too young 9. Handicapped 10. Does not need to work 11. Looks after house works 12. Looks after elderly 13. Looks after children 14. Not allowed to work (e.g. female members) 15. Does not want to work 16. Other (please specify)	2.05 What is/are the household members' occupations? 1. Farmer 2. Livestock/herdsman 3. Retired 4. Craftsman 5. Forestry Worker 6. Civil Servant 7. Gatherer (NTFP) 8. Teacher 9. Pastor 10. Student 11. Traditional Healer 12. Unemployed 13. Other (please specify if different than the above. Eg.11: Hawker)	2.06 Who is s/he working for? 1. His/her own business (gets all or a share of the profits) 2. Family business (Works with a wage) 3. Family business (unpaid) 3. Small enterprise (less than 10 workers) 4. Medium or large enterprise (More than 10 workers) State which industry (e.g. 4. forestry) 5. Government department 6. Other (please specify)
1					
2					
3					
4					
5					
6					
7					
8					

2.07 What are the main income sources of your household? (1 important, 2 less important, 3 least important, 0 none)

	Importance			Obtained by whom
Income Source	Low	Medium	High	M/F/B
1. Wage/salary				
2. Farming (Crops)				
3. Husbandry (Livestock)				
4. Forest and Forest products				
5. Tourism				
6. Trading				
7. Pensions				
8. Grants (specify which one)				
Other (Please specify)				
9.				
10.				
11.				

2.08 Please quantify the level of economic benefits your household obtains from the forest

None	Minimal	Average	High	Very high

2.09 What percentage of your household's income is derived from the forest?

0%	1-30%	30-60%	60-80%	80-100%

2.10 Please place an X next to those Forest Products/Benefits which you collect/utilise from the forest (differentiating between household consumption and the sale thereof), indicate the importance there of (L=Low, M=Medium, H=High), who obtains the benefits (M/F/B = Male/Female/Both), and indicate how often you gather the above benefits/products from the forest

			Level of importance			Collected by				
NTFP	Household use	Sale	L	M	H	M/F/B	Daily	Weekly	Bi-weekly	Monthly
Fuelwood										
Thatch grass										
Medicinal plants										
Fruit										
Honey										
Grazing for livestock										
Hunting/ bush meat										
Building material										
Sand mining										
Aesthetic Value										
Reeds for weaving										
Other (Specify)	Household use	Sale	L	M	H	M/F/B	Daily	Weekly	Bi-weekly	Monthly

2.11 Please list the volume of benefits obtained from the forests per month

Benefit / NTFP	Quantity	Unit of measure (e.g. kg, poles, etc.)
Fuelwood		
Thatch grass		
Medicinal plants		
Fruit		
Honey		
Grazing for livestock		
Hunting/ bush meat		
Building material		
Sand mining		
Aesthetic Value		
Reeds for weaving		
Other (Specify)	Quantity	Unit of measure (e.g. kg, poles, etc.)

2.12 Has your household made a cost (time, money, effort) saving due to the provision of the following amenities through forestry:

#	Amenity	Limited	Average	High
1	Forest road access			
2	Fire breaks			
3	Open grassland management			
4	Conservation of indigenous forest			
5	Health Clinics			
6	School/crèche/ Early Childhood Development Centre			
7	Community hall			

2.13 Do you believe that forestry has the potential to improve the economic situation of your household/community?

Yes	No	Please explain

SOCIAL

3.01 Please indicate which of the following social benefits you have obtained from the forest, how often, and the importance thereof for your household: (M/B/F = Male/Female/Both)

	Utilisation				Utilised by	Degree of importance		
Benefit	Daily	Weekly	Bi-Weekly	Monthly	M/F/B	Limited	Average	High
1. Employment								
2. Access to gravesites								
3. Training/skills development								
4. Road access								

5. Healthcare (e.g. clinic)								
6. School/crèche								
7. Rental income								
8. CSI projects (e.g. halls, Early Childhood Development)								
9. Access & protection of traditional customs								
10. ED project (business)								
11. Traffic noise abatement								
12. Building material								
13. Safety/equipment								
14. Security in rural area								
15. Disaster/ risk reduction								
16. Job Security								
17. Education (Bursaries, etc.)								
Other (Please specify)	Daily	Weekly	Bi-Weekly	Monthly	M/F/B	Limited	Average	High
18.								
19.								
20.								
21.								
22.								

3.02 Please select the option below which best describes your situation, that of your household and/or community:

#	Question	No	Somewhat	Yes
1	Do you find the forests provide a calm and peaceful environment to live in?			
2	Has the forests and related JCF improved social relations within your community?			
3	Has the forest JCF been proactive in resolving community conflicts?			
4	Do you believe the forest has improved the social wellbeing of your household?			
5	Has forestry improved support from Non-Governmental Organisations/Government?			
6	Has the presence of forestry improved your social status/ influence in the community?			
7	Has forestry improved the security of your household/community?			
8	Has forestry improved the quality of life of your household/community?			

3.03 Please list the three most important social benefits you obtain from the forests, according to priority of importance:

Priority	Benefit
1	
2	
3	

3.04 If a family member was to obtain employment in the plantations, how do you think plantations would benefit your household? Choose one that most applies to your household.

Benefit	Selection
Income	
Education for children	
Food security	
Would not benefit our household	
Other_____	

ENVIRONMENTAL

4.01 Please indicate which of the following environmental benefits/products you obtain from the forests: (M/B/F = Male/Female/Both)

Benefit	Utilisation				Utilised by	Degree of importance		
	Daily	Weekly	Bi-Weekly	Monthly	M/F/B	Limited	Average	High
1. Improved grazing								
2. Sustainable NTFP collection								
3. Improved water quality								
4. Protected biodiversity								
5. Wind break								
6. Shade								
7. Shelter (e.g. for livestock/crops)								
8. Reduced soil erosion								
9. Fire protection								
10. Reduced dust								
11. Reduced runoff/floods								
12. Crop land/agroforestry								
13. Improved soil fertility								
Other (Please specify)	Daily	Weekly	Bi-Weekly	Monthly	M/F/B	Limited	Average	High
14.								
15.								
16.								
17.								
18.								

4.02 Please select the option below which best describes your situation, that of your household and/or community:

#	Question	No	Somewhat	Yes
1	Do you believe the forest has improved the environment around your community?			

2	Do woman in the household utilise the forest resources more than the men?			

4.03 Please list the three most important environmental benefits you obtain from the forests, according to priority of importance:

Priority	Benefit
1	
2	
3	

4.04 Please indicate how important the overall environmental benefits your household obtains from the forest are:

Unimportant	Limited	somewhat	Critical

GENERAL

5.01 Please indicate the importance of the following three benefit categories according to your household needs, by rating them from 1 to 3 (1 being most important and 3 being least important):

Category	Importance
Environmental benefits	
Social benefits	
Economic Benefits	

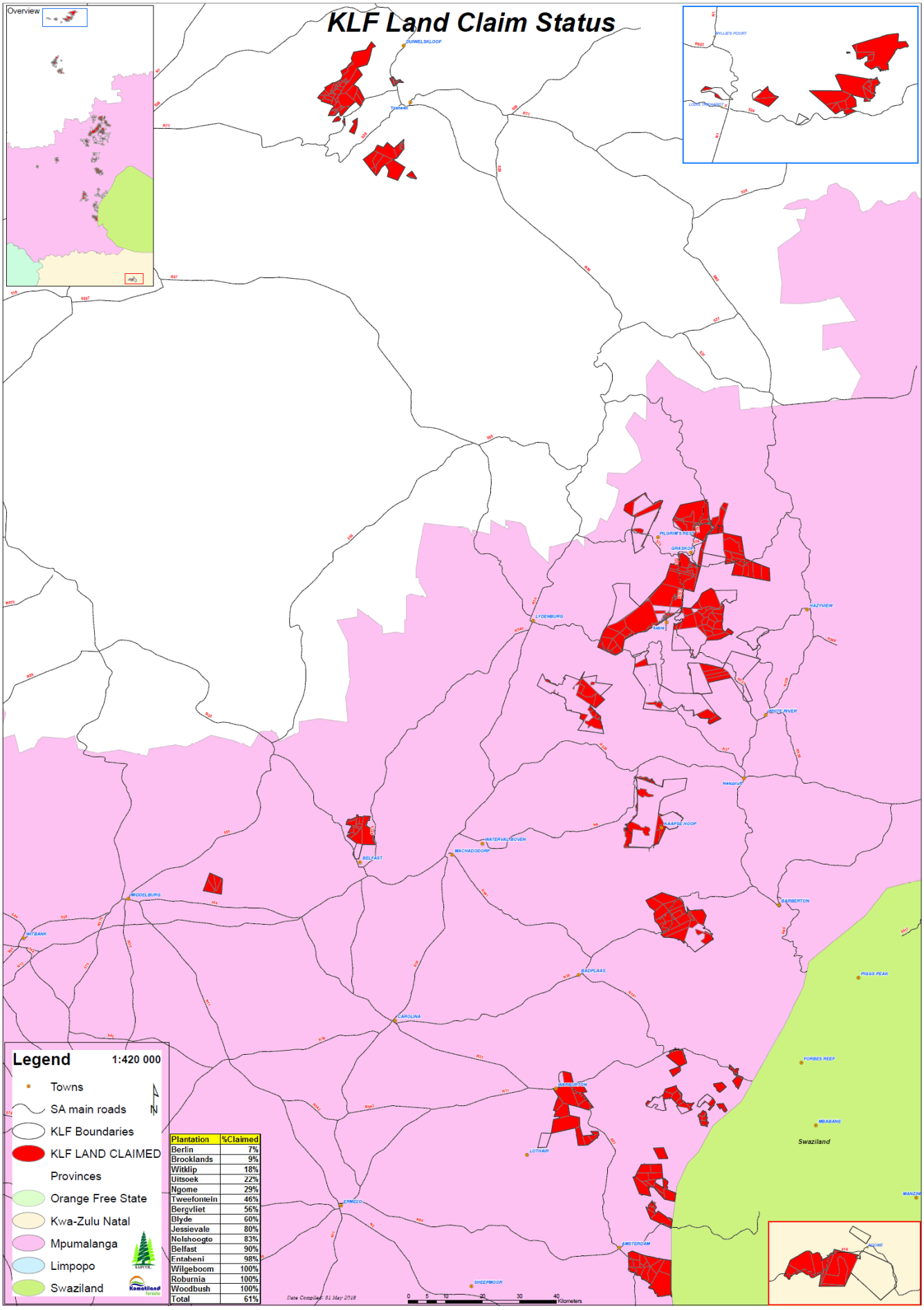
5.02 Given the opportunity, would you like to participate more actively in forest operations and management?

Yes	No	In what capacity?

5.03 Do you feel you are getting maximum benefit from the forests?

No	Somewhat	Yes

APPENDIX C


KLF Land Claim Status
Overview
Legend
1:420 000
Towns
SA main roads
KLF Boundaries
KLF LAND CLAIMED
Provinces
Orange Free State
Kwa-Zulu Natal
Mpumalanga
Limpopo
Swaziland
Plantation %Claimed
Berlin 7%
Brooklands 9%
Witklip 18%
Uitsoek 22%
Ngome 29%
Tweefontein 46%
Bergvliet 56%
Blyde 60%
Jessievale 80%
Nolshoogte 83%
Belfast 90%
Entabeni 98%
Wilgeboom 100%
Roburnia 100%
Woodbush 100%
Total 61%
Date Compiled: 31 May 2016
0 5 10 20 30 40 Kilometers
Swaziland

APPENDIX D

Selected development Indicators for major developing regions (Sachs 2004).

Region	Gross National Income per capita, 2001 (USD)	Average annual growth in GDP per capita, 1980-2000 (%)	Life expectancy at birth, 2001 (years)	Under-five mortality rate, 2001 (deaths per 1 000 live births)	Average annual growth in population, 2001 (%)
Tropical sub-Saharan Africa	271	-1.1	46.0	172.5	2.3
South Asia	449	3.3	62.6	95.3	1.7
Latin America	3 669	0.5	70.6	32.7	1.4
East Asia and the Pacific	3 710	6.4	70.2	38.3	0.8
Middle East and North Africa	2 207	0.9	68.4	49.8	2.0

APPENDIX E

Gross Value Add in the forest sector per region globally (UNFAO 2014).

Region	Gross value added in the forest sector (in billion USUSD at 2011 prices)				Share of the forest sector gross value add in total GDP (%)			
	Forest	SWP	PP	Total	Forest	SWP	PP	Total
Africa	11	3	3	17	0.6	0.2	0.1	0.9
Asia and Oceania	84	66	111	260	0.3	0.3	0.5	1.1
Europe	35	61	68	164	0.2	0.3	0.4	0.9
North America	26	29	61	116	0.2	0.2	0.4	0.7
Latin America and Caribbean	14	12	24	49	0.3	0.2	0.4	0.9
World	169	170	266	606	0.3	0.3	0.4	0.9

Note: Forest = forestry and logging activities, SWP=sawnwood and wood-based panel production, PP=pulp and paper production.

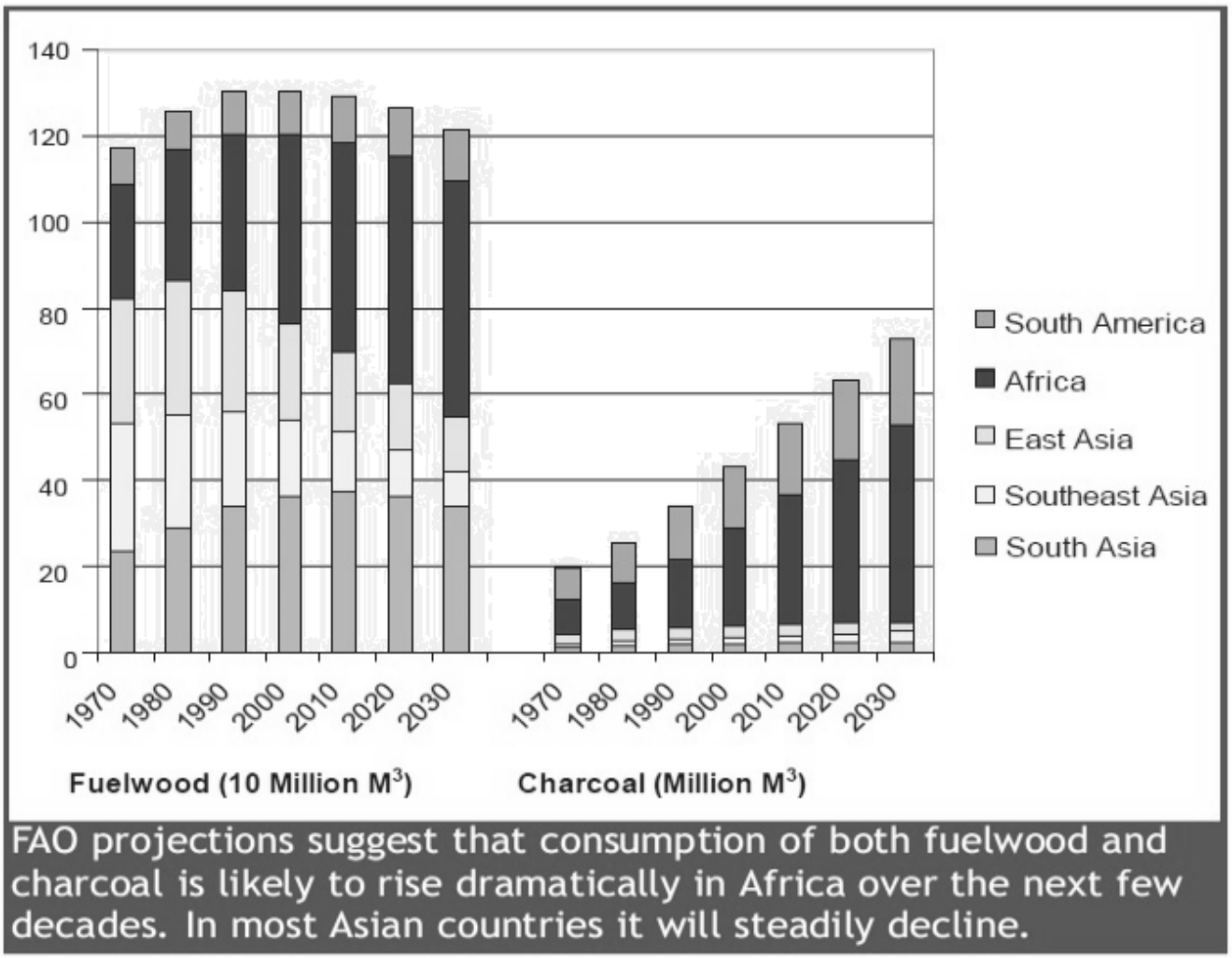
APPENDIX F

Comparison of the estimated 2011 income from the informal production of NTFP globally (UNFAO 2014).

Region	Income (in million USUSD at 2011 prices)			
	Medicinal Plants	Animal-based NTFP	Plant-based NTFP	Total
Africa	52	3165	2082	5299
Asia	171	3549	63688	67408
Europe	446	2130	5450	8026
North America	0	1016	2627	3643
Latin America and Caribbean	29	646	2963	3638
World	697	10506	76810	88013

APPENDIX G

Projections of fuelwood consumption globally (CIFOR 2003).



CIFOR 2003.

APPENDIX H

A global comparison of the percentage proportion of households utilising forest products in house construction in 2011 (UNFAO 2014).

Region	Percentage of households using forest products for house construction (%)		
	Walls	Floor	Roof
Africa	9	2	12
Asia and Oceania	20	5	7
Europe	4	4	0
Latin America and Caribbean	11	4	7
World	15	4	7

APPENDIX I

Average FPES/NTFP utilisation (%) comparison with similar Zambian study (Kalaba et al. 2012).

FPES	Comparability	
	Thesis study	**Zambia study**
Fruits	26.1	88.9
Honey	10.9	10.2
Medicinal	26.1	66.3
Fuelwood	63	90.2
Fodder	13	24.8
Construction	26.1	87.2
Average	**33.98**	**61.27**