

Integrated National Forest Protection Strategy 2014



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Integrated National Forest Protection Strategy

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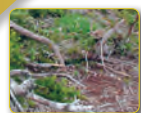
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Foreword by the Minister



Ms Tina Joemat-Pettersson

The role of the forest sector in contributing to broad-based national and international economic growth is well documented and recognised. In South Africa, the forest sector plays an important role in providing renewable natural resources, sustaining commercial industries, and conserving our biological diversity. In the face of climate change, these are important contributions.

The forest sector faces numerous challenges in fulfilling this role, including natural disasters such as droughts, floods and fires as well as disease outbreaks. On the man-made side, we face challenges of increased production costs, skill shortages and limited access to markets, all of which need to be addressed.

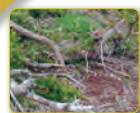
Many of these threats can be managed through integrated and collaborative measures, involving all relevant parties and the development of public-private partnerships. This strategy therefore provides an encompassing strategic framework for the Forest

Sector that seeks to align current efforts and identify those areas that need further attention. South Africa is privileged to have a well-established institutional and human capacity base to take on the challenges of the future, but it is essential that these are in harmony with each other. With such a base we can build the sector with a sense of trust and confidence.

The benefits of this strategy will be felt by the broader community in the form of a vibrant sector, job creation and wealth for the country, and especially for poor rural communities. The Integrated National Forest Protection Strategy relies on the commitment of all parties to work together to ensure proper implementation, and I hereby call on all our partners—economic and social—to make this commitment. In turn, my department will remain focused on its goal of ensuring adequate resourcing and effective management of the strategy.

Ms Tina Joemat-Pettersson MP
MINISTER OF AGRICULTURE, FORESTRY AND FISHERIES





Acronyms

ARC	Agricultural Research Council	ICS	Incident Command System
BOP	Best Operating Practice	IFM	Integrated Fire Management
CoGTA	Department of Cooperative Government and Traditional Affairs	IFQRG	International Forestry Quarantine Research Group
CPM	Commission on Phytosanitary Measures	IPM	Integrated Pest Management
CSIR	Council for Scientific and Industrial Research	IPPC	International Plant Protection Convention
CTHB	Centre of Excellence in Tree Health Biotechnology	ISPM	International Standards for Phytosanitary Measures
DAFF	Department of Agriculture, Forestry and Fisheries	ITTO	International Tropical Timber Organisation
DEA	Department of Environmental Affairs	MFWC	Mpumalanga Forestry Wildfire Committee
DMA	Disaster Management Agency	NDA	National Department of Agriculture
DMC	Disaster Management Centre	NFAC	National Forest Advisory Council
DoJ	Department of Justice	NFPS	National Forest Protection Strategy
DoT	Department of Transport	NGO	non-government organisation
dti	Department of Trade and Industry	NMMU	Nelson Mandela Metropolitan University
DWA	Department of Water Affairs	NRF	National Research Foundation
DWAF	Department of Water Affairs and Forestry	NVFFA	National Veld and Forest Fire Act
EIA	Environmental Impact Assessment	PFWG	Pine <i>Fusarium</i> Working Group
FABI	Forestry and Agricultural Biotechnology Institute	PPRI	Plant Protection Research Institute
FAO	Food and Agriculture Organization of the United Nations	RFPA	Regional Fire Protection Associates
FDI	Fire Danger Index	SADC	Southern African Development Community
FDR	Fire Danger Rating	SAFCOL	South African Forestry Company (Ltd)
FFSC	Forest Fire Steering Committee	SASCP	South African <i>Sirex</i> Control Programme
FPA	Fire Protection Association	SFM	Sustainable Forest Management
FSA	Forestry South Africa	SOP	standard operating procedure
FSC	Forestry Stewardship Council	THRIP	Technology and Human Resources for Industry Programme
FTT	Fire Task Team	TPCP	Tree Protection Cooperative Programme
FTWG	Fire Technical Working Group	UFPA	Umbrella Fire Protection Association
GDP	Gross Domestic Product	UNISDR	International Strategy for Disaster Reduction (United Nations)
ICASA	Independent Communications Authority of South Africa	WfW	Working for Water
ICFR	Institute for Commercial Forestry Research	WoF	Working on Fire
		WRC	Water Research Commission
		WTO	World Trade Organization

Executive summary

The encompassing principle in the formulation of a National Forest Protection Strategy (NFPS) for South Africa is the recognition that timber plantations represent a major national economic asset, and that the sustained production of wood and fibre is threatened by a number of factors, including pests, diseases and fire.

Forests are complex ecosystems providing a range of valuable economic, social and environmental benefits to a wide range of people. Timber, fuel wood, fibre and non-wood based products, combating desertification, protecting wetlands, maintaining biodiversity, enhancing carbon sequestration and preserving social and cultural values, are but some of the more important values derived from forests. Therefore it is critically important to conserve and protect this valuable resource.

Solutions to this problem are multifaceted and complex, involving participation of national and local government, government agencies, local communities, commercial farmers and timber companies. In a broad sense, the strategy *is a national strategy*, and the implementing agency is the government. However, the participation of a wide range of stakeholders is fundamental to its successful implementation.

Common shortcomings identified include the lack of an overall integrated and coherent approach and a lack of coordinated involvement of role players. These are highlighted as key for managing threats associated with pests, diseases and fire, and emphasise the urgent need to develop and implement an NFPS which will address the requirements of both aspects from a common base, and with common objectives. There are many aspects and issues detailed in this strategy that are already in place, and this document aims to provide an encompassing strategic framework at a national level that will align current efforts and identify those areas that need to be expanded.

In terms of the Forestry Sector Transformation Charter, the South African Forest Industry is identified as a key role player in enabling local and rural communities to play a greater role in the economic activities of forest enterprises, particularly as a means to eradicate poverty and create local economic development. Protection of forests from external threats such as fire, pests and diseases ensures both the future economic survival of the industry and creates economic opportunities for local and rural communities.

In addition, the transformation of the forest sector as envisaged in the Forest Sector Transformation Charter, and in particular, the shift in forest landownership from a small number of larger enterprises to a larger number of smaller enterprises, will also have an impact on the risk associated with pests and diseases as well as fire. This implies that there will be a much greater need for the industry and the government, on a collective basis, to play an enhanced role in helping to combat the pest, disease and fire risks in forests.

Forest protection is not solely related to issues dealing with pests, disease and fire. There are other risks involved, for example climate and, in particular, climate change, damage-causing animals, invasive plants, illegal logging, and illegal trade in forest products, among others. Later in this document, some of these have been identified in further detail, providing information on the extent of the threats, their impact, and some mitigating strategic actions.

The methodology used in developing this strategy involved the development of a basic framework with goals, principles and strategic actions. Two specialist task teams dealing with pests and diseases, and fire respectively were established and mandated to produce the technical inputs for these components and a proposed implementation plan for achieving the goals. Wide technical and stakeholder consultation has taken place to ensure that all aspects are adequately addressed.

The Pest and Disease component of the NFPS aims to actively and timeously identify, possibly eradicate, or manage through minimising and controlling the risks of, or damage by, native and non-native organisms to timber plantations.





A number of aspects have been highlighted as specific goals with related principles and specific actions and interventions, and include:

- **Policy and legislation:** To ensure that all pest and disease management activities are compliant with, and supported by appropriate legislation;
- **Institutional framework, capacity development and cooperation:** To develop and strengthen human resource development, technical capacity and cooperation at a regional and national level to ensure implementation of a national pest and disease policy.
- **Monitoring and surveillance:** To provide and manage comprehensive databases of monitoring information regarding current and future pest and disease threats, both from inside South Africa and from outside its borders, to enable appropriate risk assessment and management.
- **Prevention:** To prevent the introduction of non-native pests and diseases into South African timber plantations and to reduce disease/pest outbreaks, including those arising from host-shifts.
- **Eradication (where possible):** To prevent newly introduced pests and diseases from establishing in the country through eradication before spread occurs over a wide area.
- **Control and management:** To reduce the impact of pests and diseases of trees.
- **Rehabilitation and restoration:** To agree on and implement a programme that will facilitate the speedy rehabilitation and restoration of forestry areas that have had to be clearfelled and/or taken out of production as a result of attack by pests and diseases.
- **Awareness and education:** To develop knowledge and understanding of current and potential pest and disease threats and their management among all relevant stakeholders, decision makers and the public.
- **Research:** To provide appropriate knowledge to ensure effective and sustainable tree health management.

The Fire component of the NFPS aims to highlight the various aspects of fire protection, through a comprehensive and multidisciplinary approach, setting broad goals and proposing actions that are required to achieve these.

In South Africa a great deal of knowledge has been developed over the years, much of it focussed on fire prevention, fire mitigation, fire behaviour and firefighting. Great strides have been made in the last few years with respect to the formation and functioning of Fire Protection Associations (FPAs) and government support for fire suppression activities, for example, Working on Fire Programme. However, in general, very little attention has been given to researching the causes of fires and analysing data from major wildfire events to assist in the formulation of the fire policy. A comprehensive and consistent fire prevention and fire mitigation strategy on a regional basis has to be implemented in South Africa yet.

It also needs to be emphasised that this is a strategic not an operational plan. Ultimately, the various stakeholders will have to develop an operational plan based on what will emerge from the acceptance of this document as the agreed strategic action and implementation plan. With this in mind a comprehensive list of strategic actions and an implementation plan is presented later on in the document. However, the following represents the most urgent strategic actions that demand attention as recommended by the Fire Task Team.

The Fire Protection Strategic Goals are:

- **Policy and legislation:** To ensure that all fire management activities are compliant with and supported by appropriate legislation.
- **Institutional framework, capacity development and cooperation:** To develop and strengthen human resource development, technical capacity and cooperation at a regional and national level to ensure implementation of a national fire policy.
- **Awareness and education:** To develop a greater awareness and understanding, and encourage a culture of reporting among the public, rural communities, landowners, legislators and decision makers, of the impact of and risks associated with forest fires as well as preventative measures associated with these.

- **Fire prevention:** To prevent fires by an efficient, cost-effective fire management programme.
- **Fire mitigation:** To retard and slow down fire development, thereby preventing uncontrollable fires and subsequent disasters.
- **Control and management of fire outbreaks:** To ensure efficient and effective rapid response to forest fires and fires threatening forests, and establish protocols for these.
- **Rehabilitation and restoration:** To implement a programme that will facilitate the speedy rehabilitation and restoration of timber plantations, including both timber stands and conservation areas (wetlands and grasslands within the forest plantation) that have been damaged as a result of fires.
- **Monitoring, assessment and research:** To develop tools that allow a comprehensive analysis of fire incidences and research factors associated with fire and fire risk.

Implementation of the NFPS has to be considered in a national and regional context. Although the primary responsibility resides with government, within the mandate of the current Department of Agriculture, Forestry and Fisheries, the successful implementation of the strategy is dependent on the coordination and collaboration of all of the stakeholders in the forestry sector. Primarily, it is dependent on the commitments made by the public and private sector as signatories of the Forest Sector Transformation Charter (May 2009).

In the charter there is an undertaking to develop an NFPS to reduce the currently escalating losses being experienced through fires, pests and diseases and other threats. Broad roles and responsibilities for both the public and private sectors are outlined.

The key success factor for the implementation of the NFPS is the establishment of a Forest Protection Steering Committee comprising the public and private sectors. This committee would use the strategy and its implementation plans to guide its activities, by:

- Establishing its terms of reference (from the Forest Sector Transformation Charter) through a formal Memorandum of Understanding which should outline roles and responsibilities.
- Developing priorities in terms of identified risks to the forestry sector.
- Establishing and mandating subcommittees to deal with specific, high priority aspects of forest protection.
- Addressing high priority activities identified through the provision of appropriate resources.
- Reporting on the state of forest protection to the public and private sector on a regular (at least annual) basis.

It is proposed that subcommittees be established along similar lines for each of the key components of the strategy. At this stage a National Forestry Pests (include damage-causing animals as well as insect pests) and Disease Authority, and a National Forest Fire Authority are proposed. Again these should comprise all key stakeholders in the forestry sector affected by this component. This strategy shows detailed implementation plans for each of the two components (Appendices 1 and 2) and these should be used to guide the component implementation.

In the overall implementation of the NFPS, two separate and distinct elements are proposed:

- Management, coordination and monitoring of the process itself;
- Implementation of specific interventions in terms of the implementation plan.

It is estimated that the additional costs to initiate the above elements will amount to approximately R12 million. There are already many aspects of both components of this strategy in place. This strategy aims to provide an encompassing strategic framework at a national level that will align current efforts and identify those areas that need to be expanded.

Existing initiatives in forest protection (e.g. South African *Sirex* Control Programme, South African Pitch Canker Control Programme, ICFR's Integrated Pest Management Project, Baboon Damage Working Group, Working on Fire, Regional Fire Management Committees, FPAs, MFWC, and MLILO should be aligned to, and coordinated by, the National Forest Protection Steering Committee and its subcommittees.





SECTION 1

The need for a National Forest Protection Strategy

1.1 OVERVIEW OF HISTORY AND CURRENT CONTEXT

Forests are complex ecosystems that provide a range of valuable economic, social and environmental benefits to a wide range of people. Timber, fuel wood, fibre and non-wood based products, combating desertification, protecting wetlands, maintaining biodiversity, enhancing carbon sequestration and preserving social and cultural values are but some of the more important values derived from forests. Therefore, it is critically important to conserve and protect the forest resource.

Pests, diseases and fire are three of the most important disturbances from which forests have to be protected. Sustainable forest management (SFM) aims to mitigate these risks. Despite increased efforts, evidence suggested that worldwide the risks continue to escalate on an exponential basis with devastating consequences.

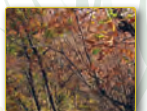
This strategy has been developed in compliance with various legislation, in particular the National Forests Act, Act No. 98 of 1998 and the Forest Sector Transformation Charter, in an attempt to assist in management and decision making aimed at combating of pests, diseases and fire in the country's forest resource.

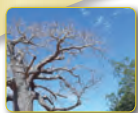
As the political landscape in South Africa has changed, so has the ownership of land both of timber plantations and surrounding areas. At the latest estimate, approximately 10% of forestry land has been handed over as part of the land reform process and 50% of existing forestry land is still earmarked for land claims. In addition, approximately 30% of the land bordering timber plantations is earmarked for land claims. Such major developments in changing landownership will have a number of implications for forest protection management:

- Willingness of new owners, trusts, etc. to become members of relevant initiatives;
- The time of land transfer between previous and new owner;
- Land may become unmanaged for long periods of time or poorly managed;
- Expertise in managing land for pests, diseases and fire is lost;
- Equipment standards and availability are lagging;
- Absentee landlords or tenants or lack of clarity on ownership;
- Need to engage with existing community structures for land reform beneficiaries.

There are two aspects of climate that affect the development of an NFPS; short-term variation and long-term trends. An important factor in the incidence of fires in South Africa is the rapid change in weather conditions and the inevitable development of suitable conditions for fires. This is unlikely to change and there will always be a high proportion of days when the fire danger rating is high. Current international emphasis on climate change suggests that extreme events will become more frequent. This will obviously add to increased levels of stress imposed on timber plantations, and reports indicate that stress is closely linked to pest and disease susceptibility. Fire also poses an increased susceptibility to pest and disease attack, and the various aspects are intrinsically linked.

Legislation relating to pests and diseases as well as fires has taken on added significance in recent years again underscoring the importance which the government attaches to these issues. Table 1 on page 6 summarises some of the primary key legislation in place.



**TABLE 1: Primary legislation in South Africa governing both pests and diseases and fire**

Applicable Act	Act number and date
<i>Pests, diseases and fire</i>	
Conservation of Agricultural Resources Act	Act No. 43 of 1983
Sustainable Forest Development in South Africa: White Paper	White Paper, March 1997
National Forests Act	Act No. 68 of 1998
National Environment Management Act	Act No. 107 of 1998
Forest Sector Transformation Charter and Companion Document	May 2009
<i>Pests and diseases</i>	
Plant Improvement Act	Act No. 53 of 1976
Agricultural Pests Act	Act No. 36 of 1983
Agricultural Research Act	Act No. 86 of 1990
National Environmental Management: Biodiversity Act	Act No. 10 of 2004
<i>Fire</i>	
Atmospheric Pollution Prevention Act (as amended in the National Environment Management: Air Quality Act)	Act No. 45 of 1965 Act No. 39 of 2004
Mountain Catchment Areas Act	Act No. 63 of 1970
Fire Brigade Service Act	Act No. 99 of 1987
Occupational Health and Safety Act	Act No. 85 of 1993
National Veld and Forest Fire Act	Act No. 101 of 1998
Disaster Management Act	Act No. 57 of 2002

1.2 ECONOMIC IMPACT OF FOREST HEALTH AND FIRE

In terms of area, the South African forestry industry is relatively small, growing commercial tree species over approximately 1,25 million ha or around 1% of South Africa's landholdings. Yet in economic terms, it is a highly profitable industry producing 22 million m³ of roundwood annually, contributing nearly R22 billion per annum to the Gross Domestic Product (GDP) of the country, and providing an economic livelihood for well over 1 million people living in rural areas. Around 95% of the country's timber resource requirement comes from its plantation forestry activities, and over 200 timber processing plants are reliant on the timber produced therefrom. The need to protect this valuable resource, by controlling and reducing the impact of pests, diseases and fires is highlighted further by the country's limited ability to meaningfully expand on the current 1,25 million ha planted area.

Currently it is estimated that 20 000 ha a year are lost because of pests and diseases, and a further 20 000 ha as a result of fire. Apart from the physical resource, the financial loss in terms of reduced forest and forest product output amounts to billions of Rand each year. The indirect economic impact is also of concern, such as costs of unplanned timber harvesting, extraction and replanting with associated labour costs (Godsmark, 2007). Disruptions in the age-class distributions with related disruption of supply and temporary timber shortages will have a significant economic impact on the industry. Unless these costs are controlled and reduced, they could seriously impact on a hugely productive and viable industry, in terms of imports and exports, product supply and unemployment.

1.3 SHORTCOMINGS

Despite recent achievements, including a significant scaling up of resources and the development of world-class infrastructure, the problems facing the industry today are greater than ever before. Some of the shortcomings identified in tree protection include:

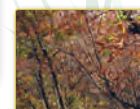
- Lack of a unified strategy;
- Lack of a coordinated involvement by all relevant stakeholders;
- Lack of national monitoring system and insufficient monitoring capacity;
- Lack of a defined suite of actions or interventions;
- Lack of relevant and/or appropriate legislation and enforcement thereof;
- Ineffective implementation of legislation;
- Lack of penalties for non-compliance;
- Insufficient awareness of pests, diseases, fires and their impact; and
- Insufficient resources and structures to facilitate research;
- Lack of participation and commitment by government bodies, local municipalities and government landowners.

In particular, the lack or absence of an overall integrated and coherent approach and a lack of coordinated involvement of key role players, is highlighted as needing to be addressed in successfully managing the threat associated with pests, diseases and fire. This emphasises the urgent need to develop and implement an NFPS which will address the requirements of both aspects from a mutual base and with mutual objectives.

1.4 THE NEED TO CONFORM TO INTERNATIONAL STANDARDS

Pests, diseases and fires in forests are global phenomena, and while this strategy is a local response to local problems, to be successful, it has to be implemented in collaboration with global knowledge and expertise, and conform to international treaties and protocols.

In the case of pests and diseases, the International Plant Protection Convention (IPPC) is of singular importance. An international treaty set up to secure action preventing the spread and introduction of pests of plants and plant products, the IPPC promotes appropriate measures for their control.





It is governed by the Commission on Phytosanitary Measures (CPM) and is recognised under the WTO Agreement on the Application of Sanitary and Phytosanitary Measures. The CPM has adopted International Standards for Phytosanitary Measures (ISPM) that include guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms, pest risk analysis, pest eradication programmes, pest status and reporting and regulating wood packaging materials. In addition, the International Forestry Quarantine Research Group (IFQRG) acts as an advisory body to the IPPC, addressing critical forestry quarantine issues through discussion and collaborative research.

In terms of fires, there are also a number of international protocols where collaboration is essential. The FAO, in collaboration with member countries and the International Strategy for Disaster Reduction (UNISDR), has developed a strategy to enhance International Cooperation in Fire Management, which includes an assessment of fire management, a review of international cooperation and a set of guiding principles for fire management. In addition, the International Tropical Timber Organisation (ITTO) has developed Guidelines for Fire Management in Temperate and Boreal Forests. Within Africa, South Africa is in the process of concluding a number of Memoranda of Understanding (MoUs) on cross-border fires with some of its neighbours. These are mainly guided by the SADC Protocol on Forest.

Many of the principles and strategic actions outlined in this document are aligned closely to ITTO's "Guidelines on Fire Management in Tropical Forests" (ITTO, 1997) and the Food and Agriculture Organization of the United Nation's "Fire Management: Voluntary Guidelines. Principles and Strategic Actions" (FAO, 2006). Even though the emphasis is on tropical regions, the former is highly relevant to South Africa, dealing with fire protection and management in the seasonal tropical regions with respect to planted and natural tropical forests and savannah ecosystems. The latter document is broader in scope and presents a global strategy for international cooperation in fire management. Several key principles and strategic actions in this document have been drawn directly or adapted from these initiatives.

Several other publications that are highly relevant to fire management in South Africa include information on fire behaviour, fire detection, integrated fire management, fire mitigation and the effects of fire on ecosystems as well as considerable detail on fire management regimes. One such publication is the "Wildland Fire Management Handbook for Sub-Saharan Africa" (Goldammer & De Ronde, 2004). Guidelines on practical issues on firefighting, particularly aimed at the forester are dealt with in the "Fire Handbook" published by the Southern African Institute of Forestry (Teie, 2003). The risk associated with veldfires in South Africa is defined in a risk analysis by Kruger *et al.* (2006); "Classification of veldfire risk in South Africa for the administration of the legislation regarding fire management".

In developing this strategy, cognisance has been taken of these and other international treaties, protocols and agreements.

SECTION 2

Current efforts and role players in forest protection

2.1 APPROACH TO FOREST PROTECTION IN SOUTH AFRICA

A key objective in establishing an NFPS is to ensure a collaborative and cooperative approach to protection through a comprehensive and effective protection programme with clear outcomes, managed on an ongoing and sustainable basis.

The National Forests Act, 1998 (Act No. 84 of 1998) clearly states that forest protection is a priority, and that government's primary role is a regulatory point of view through the promulgation and enforcement of regulations. The Forest Sector Transformation Charter also defines the role of government as providing more direct support through infrastructure, human resource capacity and funding. The National Forests Act also has a clear focus on sustaining the health and benefits of forests, section 3(c) ii and iv, which specifically state that forests should be managed to sustain the potential yield of their economic, social and environmental benefits, and to promote their health and vitality. Drafting and compilation of regulations has to be done on a cooperative basis. Industry's responsibility is to comply with regulations, and to develop and implement control programmes to protect their investments and assets. Research and protection programmes are a shared responsibility between government and industry.

Since the early 1900s, South Africa has been involved in pest and disease research, management and control. Initially this role was undertaken by government, but more recently the industry has taken the lead. Through these efforts, South Africa is recognised, today, as being among the global leaders in forest pest and disease research and management. Table 2 indicates the key role players in relation to areas identified by the pest and disease component of the strategy.

TABLE 2: The current status of roles and responsibilities for the various sections and aspects of the pest and disease component of the proposed National Forest Protection Strategy

Section	Aspect	Current responsibility
Policy and legislation	• Policy framework • Enforcement	• DAFF • DWA and DEA
Institutional framework, capacity development and coordination	• Institution strengthening • Human resource development and training • International, national, provincial and regional coordination, community liaison and international agreements • Technical assistance	• DAFF • Private Forestry Sector • University of Pretoria, FABI • ICFR • PPRI • CSIR • ARC
Research	• Research and development/ research capacity	• DST (NRF and THRIP) • University of Pretoria, FABI • ICFR • PPRI • ARC • CSIR • Other universities



TABLE 2: The current status of roles and responsibilities for the various sections and aspects of the pest and disease component of the proposed National Forest Protection Strategy (cont.)

Section	Aspect	Current responsibility
Public awareness, education and training	• Education • Training • Public awareness	• DAFF • Private Forestry Sector • ICFR • University of Pretoria, FABI • University of Stellenbosch • NMMU • ARC • Endangered Wildlife Trust (Wildlife Conflict Mitigation Programme)
Monitoring and surveillance	• National Monitoring Network • Monitoring and assessment • Data collection	• DAFF • Private Forestry Sector • University of Pretoria, FABI • ICFR • ARC • CSIR
Prevention of pest and disease outbreaks/spread	• Preborder actions • Border/Ports of entry actions • Post-border actions	• DAFF • Customs and Excise • Private Forestry Sector • University of Pretoria, FABI • PPRI
Eradication of pests and diseases/ Prevention of pest and disease establishment	• Early detection of pests and diseases • Rapid response to eradicate the threat	• Private Forestry Sector • University of Pretoria, FABI • ICFR • PPRI
Control and management of pest and diseases	• Development and implementation of appropriate control strategies	• Private Forestry Sector • University of Pretoria, FABI • PPRI • ICFR • ARC • Other universities • Endangered Wildlife Trust (Wildlife Conflict Mitigation Programme)
Post-incident rehabilitation and restoration	• Salvage • Rehabilitation plan • Rapid revegetation and re-establishment	• DAFF • Private Forestry Sector • Specialist consultants • ICFR • University of Pretoria, FABI

Losses incurred from fires have risen exponentially in recent years, resulting in a considerably enhanced fire protection effort by government and industry alike. This escalation of losses is despite the forestry industry having been a leader in the field of fire management and fire control for many decades. Table 3 indicates the key role players in relation to areas identified by the fire component of the strategy.

TABLE 3: The current status of roles and responsibilities for the various sections and aspects of the fire component of the proposed National Forest Protection Strategy

Section	Aspect	Current responsibility
Policy and legislation	• Policy framework • Enforcement	• DoJ • CoGTA (Disaster Management) • DWA and DEA • DAFF • FPOs

TABLE 3: The current status of roles and responsibilities for the various sections and aspects of the fire component of the proposed National Forest Protection Strategy (cont.)

Section	Aspect	Current responsibility
Institutional framework, capacity development and coordination	• Institution strengthening • Human resource development • Training • International national, provincial and regional coordination • Community liaison • Technical assistance • International agreements	• FPAs • UFPAs • WoF • DMAs • DAFF • Private Forestry Sector • University of Stellenbosch • NMMU
Public awareness, education and training	• Education • Training • Public awareness	• UFFPA • DAFF • FSA • ICFR • Private Forestry Sector • WoF • Municipalities • NMMU
Fire prevention	• Fire management planning • Multiple land-use objectives • Forest operations • Fire detection, early warning systems and fire hazard determination	• UFPAs • FPAs • Landowners • Private Forestry Sector • DAFF • Firehawk, EVS • Insurance industry
Fire mitigation	• Integrated fire management • Firebreaks/buffer zones • Fuel load reduction in plantations • Fuel load reduction on public conduits (roads, powerlines and railways) • Minimise harvesting wastes • Controlled burning of conservation areas	• UFPAs • FPAs • Landowners • Private Forestry Sector • Specialist consultants • Municipalities • Eskom/Spoornet • DoT
Control and management of fire outbreaks	• Preparedness • Provision of infrastructure and tools • Fire contingency planning • Initial and extended attack • Communications and command systems • Dispatch centres	• Private Forestry Sector • Landowners • UFPAs • FPAs • WoF • DMAs
Post-incident rehabilitation and restoration	• Salvage • Rehabilitation plan • Rapid revegetation and re-establishment	• Private Forestry Sector • Landowners • Specialist consultants • ICFR
Monitoring, assessment and research	• Monitoring and assessment • Data collection • Research and development/ research capacity	• Private Forestry Sector • Landowners • FSA • FPAs • DAFF • DST • ICFR • University of Stellenbosch • NMMU



SECTION 3

Pest and Disease Management Strategy

3.1 CURRENT STATE OF COORDINATION AND COOPERATION

The prevention of the introduction of forestry pests and pathogens into South Africa currently falls under the DAFF Directorate Plant Health and aspects of pest and disease management are covered under the national Agricultural Pests Act and the Plant Improvement Act. Current tree health research and management in South Africa is concentrated almost entirely with a single organisation. Current responsibilities of the research programmes include monitoring, extension, student training and research. There are also cooperative initiatives that address specific threats to timber plantations and involve a wide range of operational and research expertise. There is, however, a lack of support for tree health management programmes by appropriate legislation and enforcement thereof, and the need exists for increased human and infrastructure capacity.

3.2 OBJECTIVES

The objective of this component of the NFPS is to develop a strategic framework *at a national level* to minimise and manage the threats posed by pests and diseases, thereby ensuring the sustained production of wood and fibre from a major national economic asset.

3.3 PEST AND DISEASE PROTECTION STRATEGY

3.3.1 Policy and legislation



GOAL: To ensure that all pest and disease management activities are compliant with, and supported by appropriate legislation.

Principles

- The NFPS should be the key component of the national land use policy to ensure sustainable forest management, and be accepted by stakeholders, including government, local communities and the private sector.
- Forests (natural and commercial plantations) are a vital component of the socio-economic landscape in South Africa and are dependent upon the successful implementation of policy and legislation to protect them against pests and diseases.
- The protection of forests and therefore also the livelihoods of industry and private farmers/communities must be guided and supported by appropriate legislation.
- The effectiveness of forest health management programmes is dependent upon a clear legal, judicial and policy framework and all actions and activities should be formulated in accordance with an underlying legal framework and supported by clear policy and procedures.
- There is a progressive policy shift towards community-based natural resource management to promote local sustainable development within a framework of leadership, strategy and guidance from national and provincial spheres (DWAF, 2005) and this should be reflected in the NFPS.

Strategic actions

- Ensure implementation of all relevant legislation dealing with sustainable plantation forestry, the protection and conservation of native biodiversity;
- Ensure that policy is based on best science and experience;





- Examine the effectiveness of current legislation in providing a clear legal, judicial and policy framework that underpins and enables the formulation of effective pest and disease management plans;
- Ensure consistency between the various acts/legislation that affect the formulation of pest and disease management planning for forests and plantations;
- Develop enforcement protocols and rules and regulations to encourage and facilitate compliance to legislation;
- Create a system of incentives to encourage stakeholder participation in pest and disease prevention and management at a local and regional level;
- Implement penalties for infringement, so that enforcement of the relevant legislation is encouraged.

3.3.2 Institutional framework, capacity development and cooperation



GOAL: To develop and strengthen human resource development, technical capacity and co-operation at a regional and national level to ensure implementation of a national pest and disease policy.

Principles

- Key constraints to the effective prevention, eradication and management of pests and diseases are the lack of a central, coordinated body to implement and fund monitoring and control and management activities and a shortage of research capacity (human and infrastructure) to effectively deal with all current and future pest and disease problems.
- The implementation and effectiveness of an NFPS is only possible when supported by strong institutional structures and skilled people. Because of this, attention must be given to strengthening relevant institutions and human resource development.
- Maintaining forest/plantation health is reliant on sound forestry operating procedures and integrated management. It is, therefore, important that forest protection should form a key component of the training programmes and curricula of tertiary training facilities.
- Pest and disease management affects broad sectors of society and must be implemented by a range of stakeholders such as timber companies, small and large-scale farmers, local communities, and national and provincial governments. It is, therefore, important to coordinate activities of the various agencies involved in pest and disease management.
- Pests and diseases do not recognise international boundaries and management may require formal regional cooperation between neighbouring countries.

Strategic actions

- Conduct a review of all current infrastructure and human capacity pertaining to pest and disease management and research in South Africa to ensure that shortcomings are addressed effectively;
- Ensure adequate funding and infrastructure for task teams to conduct their mandate effectively;
- Strengthen institutional structures at both the national and regional level that are responsible for executing national forest protection policies;
- Establish, as appropriate, an institutional framework responsible for implementing the national pest and disease protection strategy at national, provincial, and local levels with sufficient funding, staff, technical skills, equipment and operational procedures;
- Direct cooperation between all stakeholders to effectively implement the NFPS;
- Establish bilateral and multilateral agreements on cooperation with respect to pest and disease management planning and with respect to the provision of expertise, transfer of technology, and assistance in training internationally;
- Develop capacity and infrastructure for those who will train and instruct forestry researchers, farmers and foresters;

- Maintain an effective pest and disease extension service that provides diagnostic services and holds regular field days with relevant stakeholders;
- Provide regular communication channels with forest-based communities;
- Publish regularly in all relevant print and electronic media regarding the status of forest pests and diseases in the country;
- Develop and disseminate relevant information through print and electronic media to all key stakeholders;
- Design and implement awareness initiatives (e.g. field days) and promote these through specific channels.

3.3.3 Research



GOAL: To provide sufficient infrastructure and capacity to enable appropriate short, medium and long-term research on which to base pest and disease management strategies.

Principles

- Sustainable forestry relies on sound and current knowledge.
- Sustainable, cost-effective tree health management relies on applying the most appropriate management strategies for a particular situation.
- Every country is unique and requires specific management actions. Therefore available technologies have to be refined and new locally relevant approaches for pest/disease identification and management must be developed through pest and disease research.
- There should be a clear understanding of the biology, ecology and genetics of pests and pathogens and the knowledge and understanding derived applied in such a way as to support management and control strategies.

Strategic actions

The focus is on developing pest and disease management strategies through the following:

- Supporting long-term research on the taxonomy, biology, ecology, epidemiology and genetics of forest pests and disease systems in South Africa as well as in neighbouring countries and those with which South Africa trades;
- Developing appropriate and effective diagnostic tools;
- Developing appropriate and effective monitoring tools (e.g. field trials, bioassays, predictive models);
- Establishing techniques to facilitate screening and breeding procedures for pest and disease resistance/tolerance in trees;
- Developing silvicultural practices that aim to avoid or mitigate the impact of specific pest and/or disease problems;
- Identifying and developing suitable biological control measures for specific pest and/or disease problems.

3.3.4 Awareness and education



GOAL: To develop a greater awareness and understanding among the public, rural communities, landowners, legislators and decision makers of the impact of and risks associated with current and future pests and disease threats as well as preventative measures associated with these.

Principles

- Education and training of all stakeholders in aspects of pest and disease management are key factors in the successful implementation of a pest and disease management programme. Stakeholders





include rural communities, landowners, farmers, farm workers, forest managers, foresters, contractors and members of the public.

- Farmers and foresters are often unaware of the causes of tree disease that result in economic losses and ecological damage. Education and awareness can have a profound effect on these perceptions. A knowledgeable and involved public will be effective partners in the pest and disease management programme
- It is the responsibility of managers at various levels and in a range of organisations to maintain the viability and sustainability of timber plantations. These may include officials and forest managers from government departments as well as timber companies, forestry contractors and environmental non-governmental organisations. It is necessary for these managers to acquire and maintain knowledge of all aspects of forest pest and disease management.

Strategic actions

Public education

- Develop a professionally accredited pest and disease education programme aimed at ensuring understanding of the risks involved in the movement of plant material and the benefits of pest and disease management;
- Design suitable, appropriate and novel curricula on environmental issues, forest and natural resource management as part of education programmes in elementary and secondary schools. This should include basic plant/tree pest and disease components, which are accessible to all stakeholders.

Forestry contractors, workers and mensuration teams

- Design suitable, appropriate and novel curricula on pests and diseases as part of training programmes;
- Maintain an effective pest and disease extension service that holds regular field days and training sessions with relevant stakeholders;
- Train mensuration/monitoring teams in pest and disease recognition and reporting.

Foresters, farmers and technical managers

- Maintain an effective pest and disease extension service that holds regular field days and training sessions with relevant stakeholders;
- Support and provide training for existing extension officers;
- Extend and develop the capacity of existing functions;
- Create a web-based “live” map-based database showing past and current pest and disease distributions with real-time updating, linked to an early warning system that notifies interested and affected parties;
- Develop and implement specially designed education programmes among new growers in particular;
- Identify the information and training needs for relevant managers, and where necessary, disseminate appropriate materials and conduct seminars, workshops, short courses, and field training sessions dealing with the principles and application of pest and disease management;
- Provide training and conduct courses for quarantine officers, importers and exporters of forestry products and germplasm.

Tertiary education

- Support the introduction of tree health courses, with a strong focus on pests and diseases at all tertiary educational institutions where forestry and agriculture are taught;
- Prioritise the ongoing tertiary education programmes to ensure that the forestry industry has sufficient entomology and pathology professionals to support its research and extension needs (also specified in the Forestry Sector Transformation Charter).

3.3.5 Monitoring and surveillance



GOAL: To provide and manage comprehensive databases of monitoring information regarding current and future pest and disease threats, both from inside South Africa and from outside its borders to enable appropriate risk assessment and management.

Principles

A country-wide Pest and Disease Monitoring Network is designed to identify, monitor and collect data regarding possible threats/risks both outside South Africa, at the borders into the country, and within South Africa. By doing so, it aims to improve the prospects for early detection, and significantly increase the opportunity for effective control and eradication, and reduce costs associated with these. Crucial to the success of the network is a coordinated approach with participation by all relevant role players, and supported by collaborative funding.

The network should include surveillance at all ports of entry into the country, throughout the current forestry estate, and at other identified high-risk areas such as transport routes and wood processing plants. Such a network should be both general in nature, as well as targeted towards specific pests and pathogens. General non-targeted surveillance is based on recognising normal *versus* suspect plant material from which experts can determine and respond to possible threats. Targeted surveillance is required to identify the new entry of particular pests in provinces/regions, and to monitor the spread of pests/pathogens already present. It also requires monitoring changes in the success of existing management strategies, e.g. biological control agents.

Information from the monitoring network should also be used to inform and make recommendations regarding the seriousness of potential threats posed by pests and diseases, and the level of response required to these.

Strategic actions

Specific actions required to ensure achievement of the objectives of the monitoring and surveillance programmes would, *inter alia*, include:

Outside South Africa's borders

- Support a pest and disease awareness team which travels outside South Africa and networks with relevant groups/initiatives in neighbouring and foreign countries to identify and monitor possible threats associated with pests and diseases that could affect South Africa.

At ports of entry

- Develop, in collaboration with agricultural requirements, trained surveillance personnel to identify plant material infested/infected with pests and pathogens with a full knowledge of the import regulations and quarantine requirements (including training of existing customs authorities);
- Adopt, develop and implement internationally acceptable phytosanitary monitoring protocols;
- Develop and implement adequate and timeous reporting procedures that are accessible to all stakeholders.

On forestry estates

- Promote knowledge and awareness to all forestry personnel of pest and disease threats in terms of what they are, their identification and the response to them;
- Appoint or designate specific personnel as pest and disease officers and ensure that they form part of the network;
- Maintain effective communication between forestry personnel and relevant pest and disease support activities and organisations;
- Support an in-field pest and disease extension service with trained diagnosticians supported by access to a rapid response, centralised diagnostic facility;
- Facilitate knowledge acquisition and training to enable effective monitoring to take place.





Other high-risk areas

- To be decided by the Pest and Disease Monitoring Network as needs arise and depending on circumstances.

3.3.6 Prevention of pest and disease outbreaks/spread



GOAL: To prevent the introduction of non-native pests and diseases into South African timber plantations, and to reduce disease/pest outbreaks, including those arising from host-shifts.

Principles

A significant increase in the number of pest and disease problems in commercial forestry operations globally is partially the consequence of increased travel and trade between countries and continents, and is unlikely to decrease in the future. In addition, the planting of non-native tree species in new associations with related tree species, provides a bridge for pests and diseases to spread to new continents, resulting in a number of “new” disease and pest problems appearing. Increasing numbers of reports are also emerging stating that native pests/pathogens have adapted to damage non-native plantation-grown tree species. Effective border control and quarantine mechanisms, as well as good forestry practices to reduce the chances of pests/pathogens establishing are, therefore, of critical importance. Quarantine relies on accurate and up-to-date information on the pests and pathogens affecting a particular host, both in the country, and in other countries. It is also important to understand the pathways by which these organisms may move and enter a country. In terms of providing effective border control and quarantine, and to prevent the establishment and spread of pests and pathogens, the following strategic actions would be necessary:

Strategic actions

Preborder actions

- Develop comprehensive databases of information around current and future pest and disease threats from outside the country and make the information available to all stakeholders on a regular basis;
- Establish strong international collaborations with other countries to establish accurate lists of potential threats and how to deal with these;
- Undertake offshore research where potential pest and disease threats exist;
- Ensure that importers of products that could harbour forest pests and pathogens are aware of and fully comply with both international and national phytosanitary standards and regulations, for the products themselves and for packaging material.

Border/ports of entry actions

- Ensure adequate monitoring at all ports of entry, by professionally trained surveillance personnel (this must be done through collaboration with existing agricultural personnel);
- Ensure that the personnel at all relevant border posts are fully apprised and aware of import regulations and quarantine requirements;
- Ensure that adequate quarantine and disposal facilities are established at ports of entry;
- Ensure effective communication and response routes between port of entry personnel, quarantine regulators and other relevant stakeholders;
- Develop policies and legislation, in conjunction with the DAFF, to enforce appropriate quarantine guidelines;
- Establish permanent monitoring sites (e.g. trap trees, insect traps) around major ports of entry for continuous monitoring of pest and pathogen occurrence;
- Ensure adequate response mechanisms to restrict the movement of infected and potentially infected material.

Post-border actions

- Develop policies and legislation to enforce appropriate quarantine guidelines to prevent the movement of diseased/infested material from one region to another in the country;
- Introduce stringent vehicle and plant material inspection protocols;
- Amend road transport legislation to legally prevent the movement of goods and vehicles in and out of contaminated areas;
- Introduce penalties for transgression of road transport legislations;
- Implement identification and tracing systems to facilitate the tracking of timber consignments to source if these are contaminated;
- Implement public awareness and education programmes around transport and vehicle movement restrictions and embargoes, and the risks associated with non-compliance;
- Provide knowledge to all tree growers, particularly emerging farmers, on site species matching and correct silvicultural practices so as to avoid stress on trees and therefore the formation of areas where pest and pathogen populations can establish and build up.
- Provide knowledge to all tree growers on the risk associated with monoculture systems and the appropriate management of these to reduce the impact of pests and diseases;
- Proactively develop tree genotypes for tolerance to pests/pathogens not yet in the country, thereby reducing the chances of establishment when such pests/pathogens enter South Africa.

In the case of diseases in particular, introduction into forestry plantations can come from local sources such as plant nurseries, e.g. *Fusarium circinatum*. The issue of phytosanitary standards and quarantine is, therefore, as relevant to nurseries as it is to ports of entry, and similar precautions as mentioned above should apply. In this regard, a system of nursery accreditation is strongly recommended, with purchasers of seedlings being encouraged to buy only from such nurseries.

3.3.7 Eradication—prevention of pest/pathogen establishment



GOAL: Prevent newly introduced pests/pathogens from establishing in the country through eradication before spread occurs over a wide area.

Principles

After a new non-native pest or disease has been reported, it has to be rapidly identified and acted on, if eradication and/or the prevention of a possible establishment are/is to be successful. This requires active communication between all relevant departments, agencies and industry representatives in order to determine appropriate response measures. Technical and economic considerations on whether to attempt eradication, contain or cease the eradication effort have to be taken into account, depending on the likely costs and impact of the pest. Such decisions should be made through collaboration with government, research and industry representation. During this investigation period, the affected area should be placed under quarantine. Eradication or control methods by a trained response team will vary according to the nature of the pest or disease involved and infested material must be destroyed where necessary (refer to Agricultural Pests Act, Act No. 36 of 1993).

Strategic actions

Eradication response actions

Eradication of an identified pest/pathogen may only be successful if detection occurs early and where rapid and drastic response actions have been taken (refer to Agricultural Pests Act, Act No. 36 of 1993). Specific actions to be taken would include the following:

- Establish survey teams for early detection of new incursions and for monitoring of situation after destruction of infected material;
- Develop legislation to enforce destruction of infected material;





- Develop funding structure to support the destruction of infected material;
- Ensure appropriate research capacity;
- Ensure entomology/pathology in-field response capabilities;
- Establish a “proto team” to react to incursions and co-ordinate and apply eradication activities;
- Develop specific protocols for responding to new pest and disease infestations and outbreaks;
- Ensure appropriate quarantine response mechanisms to restrict movement of infected and potentially infected material; and
- Ensure compliance with all forest certification requirements.

If the pest or pathogen is considered potentially serious, then specific precautionary measures can be implemented. Depending on the pest or disease, these may include:

- Restriction of operations in an area;
- Withdrawal of people, vehicles and machinery from the area and disinfection;
- Restricted access to the area;
- Interim control or containment measures.

3.3.8 Control and management of pests and diseases



GOAL: To reduce the impact of pests and pathogens of trees.

Principles

- The management of pests and diseases that have become established in the country is multi-faceted and best achieved through an integrated approach. This includes developing a comprehensive understanding of the biology and genetics of the pest or pathogen and sound forestry practices.
- Pest and disease impact may be reduced/prevented by the planting of disease and pest tolerant genotypes (breeding and selection programmes) and by ensuring diversity in the species and clones planted.
- Integrated pest and disease management strategies, including sound silviculture as well as chemical and biological control strategies and nursery and plantation sanitation, are important for the durability and sustainability of tree health programmes.

An example where this approach has been very successfully implemented in South Africa is through the South African *Sirex* Control Programme (SASCP) set up to manage the threat of *Sirex noctilio* to pine plantations in South Africa.

Strategic actions

Suggested strategic actions that can be undertaken, include the following:

- Use chemical control, mostly in nurseries. This requires government and the forestry industry to work together to identify appropriate chemical control measures for high-priority pests/pathogens, and put procedures in place for the emergency registration of necessary chemicals;
- Biological control provides a more durable and environmentally friendly option for tree health management and has been especially successful for pest management. However, the identification of suitable, safe, biological control agents and their testing is often frustrated because of the lengthy process of obtaining research and/or release permits for biological control agents. This process should be expedited where safe and appropriate as per the Forestry Sector Transformation Charter;
- Implement and enforce quarantine procedures;
- Enforce appropriate sanitation measures;

- Conduct research on the biology and genetics of pests and diseases;
- Select, breed and deploy tolerant planting stock;
- Ensure adherence to the principles of sustainable forest management, including good silviculture and diversity in planting stock;
- Through extension, inform forestry personnel of appropriate actions to reduce the impact and spread of pests and pathogens (forest protection courses should be a mandatory component of formal forestry education);
- Support education programmes at a tertiary level in forest entomology and forest pathology to ensure the long-term availability of pathology and entomology research capacity;
- Encourage detailed record keeping of pest and disease outbreaks;
- Support the development of best management practices for damage-causing animals (baboons, rodents, eland, bushbuck, duiker, etc.).



3.3.9 Post-incident rehabilitation and restoration of infected areas



GOAL: To agree on and implement a programme that will facilitate the speedy rehabilitation and restoration of forestry areas that had to be clear felled and/or taken out of production as a result of attack by pests and diseases.

Principles

A successful tree health programme should include strategies to assist timber growers and farmers with post-incident rehabilitation and restoration. This may include compensation/financial relief to affected growers and penalties for failure to report/rehabilitate areas where pest/pathogen incursions occurred.

Strategic actions

In this regard the following actions are important:

- Maintain a strong monitoring and surveillance programme for a number of years after the problem has been resolved or the pest eradicated;
- Maintain an ongoing rehabilitation research programme supported by an effective extension service to provide support to and advice on best rehabilitation practices;
- Develop national guidelines for planting trees to ensure that genotypes known to be susceptible to a specific pest or pathogen are not planted in areas where there has been, or is likely to be, an outbreak and infestation of that particular pest or pathogen;
- Ensure that planting conditions and silvicultural practices are such that the potential for the development of tree stress is minimised;
- Ensure that all nurseries supplying planting stock to areas being rehabilitated are fully compliant with all phytosanitary requirements and that the plant material is free of contamination;
- Provide incentives for speedy rehabilitation and restoration through, among others, making available restoration grants and/or tax concessions, as appropriate.





SECTION 4

Fire Management Strategy

4.1 CURRENT STATE OF COORDINATION AND COOPERATION

The current situation regarding the various roles and responsibilities of the various stakeholders is outlined in the next section of this document according to the different aspects of fire prevention as outlined in this strategy. Current fire protection activities are underpinned by the formation and activities of the local FPAs and regional UFPAs which are, in turn, supported by various agencies such as Working on Fire, EVS firefighting technologies, FireHawk, DAFF and Disaster Management Agencies (DMAs) that provide services for, *inter alia*, fire suppression (ground and aerial support), dispatch centres, fire detection, training and fire risk assessment. FPAs conduct ongoing fire mitigation activities such as burning of firebreaks/buffer zones and fuel load reduction activities.

4.2 FIRE PROTECTION STRATEGY

A schematic outline of the main aspects of the Fire Component of the NFPS is summarised in Fig. 1.

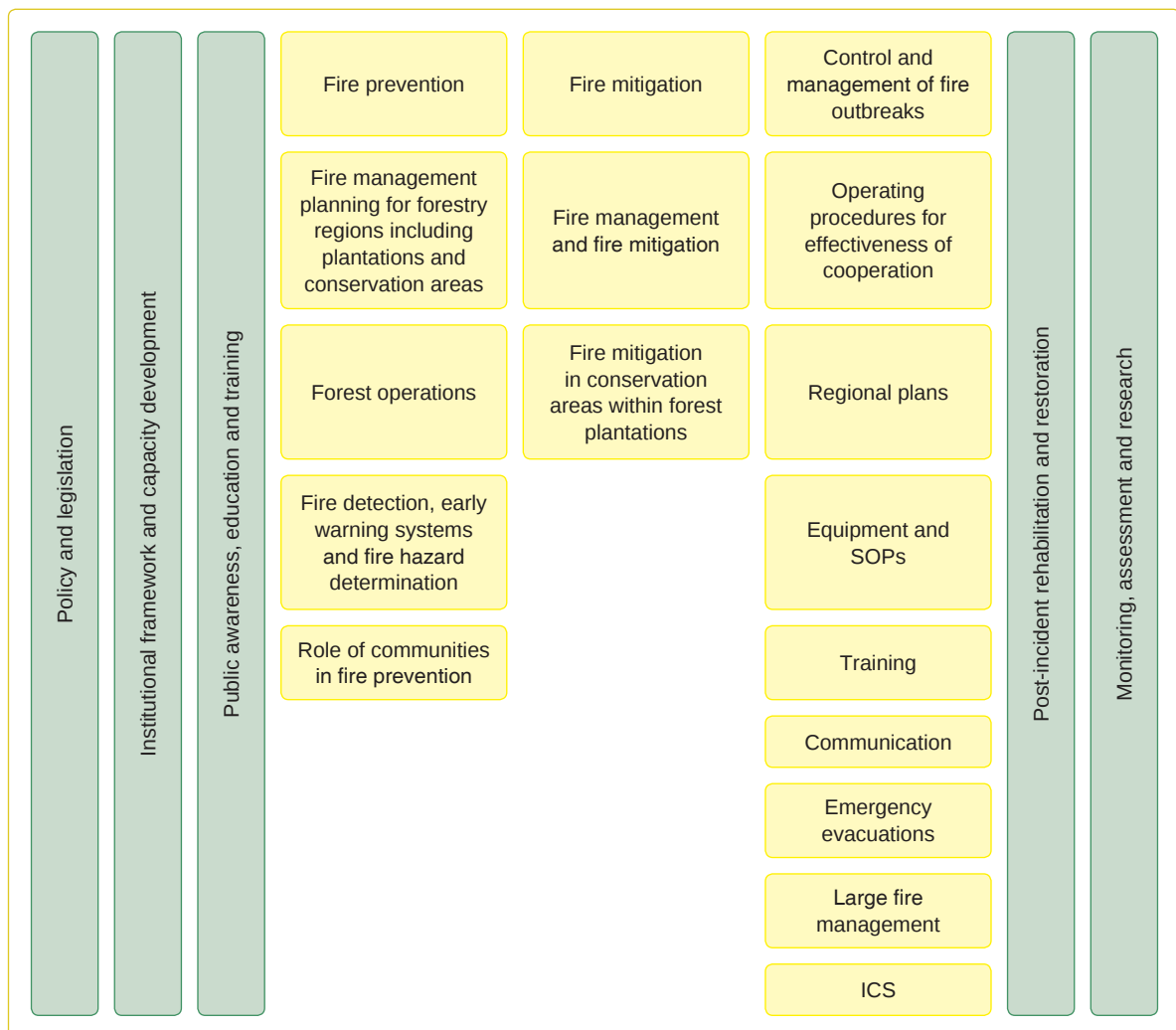


FIG. 1: A schematic outline of the main aspects of the fire component of the National Forest Protection Strategy



Sections in green in Fig. 1 are less aligned with the typical operational fire management action while the sections in yellow are the more typical fire management actions. However, these latter sections are still strategic in intent. The principles and strategic actions described in the following section can be used as a checklist to improve and support legislation, cooperation in fire management and planning, and provide a basis for public education and benchmarking of forest practices.

4.2.1 Policy and legislation



GOAL: To ensure that all fire management activities are compliant with and supported by appropriate legislation.

Principles

- The national fire policy should be the key component of the national land use policy to ensure sustainable forest management and acceptance by stakeholders, including government, local communities and the private sector.
- Plantation forests are a vital component of the socio-economic landscape in South Africa and are dependent upon the successful implementation of policy and legislation to protect them against fire.
- The support of local communities and landowners together with the responsible government authorities must be guided and supported by appropriate legislation.
- The effectiveness of fire management programmes is dependent upon a clear legal, judicial and policy framework, and all actions and activities should be formulated in accordance with an underlying legal framework and supported by clear policy and procedures.
- There is a progressive policy shift towards community-based natural resource management to promote local sustainable development within a framework of leadership, strategy and guidance from national and provincial spheres (DWAF, 2005).
- Conservation areas and areas of high cultural value and environmental significance within the fragmented landscape of plantation forests and agricultural land protect important and unique samples of grassland and forest ecosystems, and may need protection by law.

Strategic actions

- Ensure implementation of all relevant acts, particularly the National Veld and Forest Fire Act (1998), the Fire Brigade Service Act (1987) and the Disaster Management Act (2002);
- Review all policy to ensure that it is based on best science and experience;
- Examine the effectiveness of current legislation in providing a clear legal, judicial and policy framework that underpins the formulation of effective fire management plans;
- Ensure consistency between the various acts that affect the formulation of fire management planning for timber plantations and the surrounding areas;
- Put systems into place to empower FPAs to ensure compliance of national government land-holding agencies, Municipalities, Roads Department and Spoornet among others, to the Forest Fire Act;
- Enact and/or revise national and local laws and regulations regarding the proper use of fire to ensure the effective implementation of fire management policies;
- Develop enforcement protocols and rules and regulations to encourage and facilitate cooperation;
- Create a system of incentives to encourage stakeholder participation in fire prevention and management at local and regional levels;
- Create clear legal definitions of fire danger ratings as well as revise the penalties for infringement, so that FPAs are able to enforce the application of the Act;
- Establish a National Fire Weather Forestry initiative.

4.2.2 Institutional framework, capacity development and cooperation



GOAL: To develop and strengthen human resource development, technical capacity and co-operation at a regional and national level to ensure implementation of a national fire policy.

Principles

- Key constraints to the effective implementation of a National Forest Fire Protection Strategy are the existence and proper funding of FPAs.
- The implementation and effectiveness of a national fire policy and strategy is only possible when supported by strong institutional structures and skilled people. Because of this, attention must be given to strengthening the relevant institutions and human resource development.
- Fire management affects broad sectors of society and must be implemented by a range of stakeholders such as local authorities, timber companies, small and large-scale farmers, local communities and national and provincial government. It is therefore important to coordinate activities of the various agencies involved in fire management.
- Fires affect neighbouring countries and fire management may require formal international cooperation between neighbouring countries.





Strategic actions

- Conduct a review of all current policies, plans and programmes pertaining to fire management of forestry regions in South Africa to ensure that they are underpinned by the best tools, experience and are science-based;
- Ensure adequate funding for FPAs to fulfil their mandate effectively;
- Identify areas and regions not properly covered by FPAs and take steps to encourage their formation;
- Ensure national, provincial and local cooperation with well-defined responsibilities between relevant public and government institutions, such as local municipalities, service providers, umbrella and local fire associations (UFPAs and FPAs), local communities, forest companies and NGOs;
- Strengthen institutional structures at both the provincial, national and regional level responsible for executing and enforcing national fire policies;
- Establish an institutional framework responsible for implementing the national fire protection strategy at national, provincial and local levels with sufficient funding, staff, technical skills, equipment and operational procedures;
- Direct cooperation between local communities, the private sector and NGOs to effectively implement the national fire strategy programme;
- Establish bilateral and multilateral agreements on cooperation with respect to fire management planning locally and with respect to the provision of expertise, transfer of technology and assistance in training internationally;
- Source technical assistance and draw on organisations and personnel from countries with relevant expertise to build capacity and institutions to implement the fire management policies espoused in the National Fire Protection Plan;
- Develop capacity and infrastructure for those who will train and instruct firefighters and fire managers.

4.2.3 Public awareness, education and training



GOAL: To develop a greater awareness and understanding among the public, rural communities, landowners, legislators and decision makers of the impact of and risks associated with forest fires as well as preventative measures associated with these.

Principles

- Education and training of all stakeholders in aspects of fire management and the dangers of wild-fires are key factors in the successful implementation of a fire management programme. Stakeholders include rural communities, landowners, farmers, farm workers, forest managers, foresters, contractors and members of the public.
- Members of the public are often unaware of the causes of fires that result in economic losses and ecological damage. Education and awareness can have a profound effect on these perceptions. A knowledgeable and involved public will be effective partners in the fire management programme.
- If it is shown and demonstrated to be in their interest, rural communities living in the vicinity of timber plantations can become important sources of assistance in the detection, reporting, prevention and management of fires. In this respect, community and religious leaders are likely to be effective mediums for motivating the need for fire protection.
- It is the responsibility of managers at various levels and in a range of organisations to maintain the viability and sustainability of timber plantations. These may include officials and forest managers from government departments as well as timber companies and forestry contractors. It is necessary for these managers to acquire and maintain knowledge of all aspects of forest fire management.

Strategic actions

Public education

- Develop a professionally conducted wildfire and forest fire education programme aimed at ensuring understanding of the risks posed by wildfires and the benefits of fire management in fuel load reduction strategies to mitigate fires;
- Design suitable, appropriate and novel curricula on environmental issues, forest and natural resource management as part of education programmes in elementary and secondary schools. This should include basic fire management, the effects of fire on ecosystems, economies, safety and human health;
- Incorporate fire management principles into all syllabi at tertiary education institutions giving courses in land-use, agricultural, forestry or conservation activities;
- For rural communities living near or in the orbit of influence of plantation forests, conduct basic education programmes to promote awareness on the importance of the forest environment and the role of fire.

Technical Managers

- Identify the information and training needs for relevant managers, and where necessary, disseminate appropriate materials and conduct seminars, workshops, short courses and field training sessions dealing with the principles and application of forest fire management, including fire prevention and suppression;
- Provide finance, training and conduct courses for fire extension officers who can conduct basic education programmes in schools of local communities.

4.2.4 Fire prevention



GOAL: To prevent fires by an efficient, cost-effective fire management programme.

Aspects of fire prevention

- Land-use areas within forestry regions;
- Forest operations;
- Fire detection and early warning systems;
- Role of communities in fire prevention.

The general principles of fire prevention are presented below, but specific principles and related strategic actions are presented under each aspect of fire prevention.

Principles

- Fire prevention is always the most effective and cost-efficient way of achieving the goals of any fire management strategy or programme.
- Fire prevention within timber plantations and other ecosystems within and adjacent to plantations such as grasslands and agricultural land will sustain forest productivity and the maintenance of biodiversity, reduce the risk of pests and diseases and protect key ecosystem processes and carbon budgets.
- Fire prevention is an integral part of sustainable forest management which has to be underpinned by appropriate land-use planning, taking into account the legal obligations of the landowner and the needs of all stakeholders. Fire prevention will also provide the means to protect and sustain resources and ecosystem processes under one integrated fire management umbrella.
- Fire prevention plans should be drawn up in cooperation with community leaders and representatives from areas regarded as being within the orbit of influence of forestry regions, including plantations.





- In fire-dependent ecosystems, fire prevention can be effected by allowing fire under defined and controlled conditions without compromising ecological processes, human health and legislation. Subsequently, fire prevention should be holistic and applied on a regional scale, integrating plantations, indigenous forests, other natural ecosystems, ecosystem processes, riparian zone management and other related issues.
- Fire prevention differs from fire mitigation in that it aims to prevent fires completely whereas mitigation aims to retard or slow down fires that have started.

4.2.4.1 *Fire management planning for forestry regions, including plantations and conservation areas*

Principles

- The fire management plan is a component of the overall land-use resource plan and will form the basis for all other aspects of the fire management programme.
- For fire management to be effective, responsibilities have to be shared between all stakeholders, including public and private landowners, communities that border timber plantations and governmental firefighting agencies.
- Effective fire management should not compromise important ecosystem properties and processes and therefore should be carried out in an environmentally responsible manner.
- Fire management planning must take into account that forest regions and plantations are an integral part of a mosaic of various landuses, including multiple species forest stands, conservation areas, small landholders, larger farms for agricultural production, areas of historic/cultural interest, large communities (urban and rural) and recreational areas. Subsequently, all these should be integrated into a regional fire management plan.
- Fire management plans must ensure the safety of the public, firefighters and workers working and living on plantations.
- Plantation/estate fire management plans should fall within regional, provincial and national plans.

Strategic actions

- Formulate a fire management plan as part of a comprehensive land-use resource plan, based on a clear legal framework and consisting of a protection, prevention and suppression plan. The plans should:
 - Define the geographic area;
 - Include information on land tenure, threatened assets and communities, spatial fire risk, fire history and fire management measures;
 - Ensure the active participation of all affected stakeholders; local communities, timber companies, landowners, and farmers;
 - Be adapted to multiple land-use objectives within the forest estate, i.e. forest compartments, conservation areas, inhabited areas, etc.; and
 - Include appropriate fire regimes of fynbos, natural forests, and the grasslands, communal and agricultural land in the broader regions in which plantations are present.
- Fire management activities should not adversely affect the surrounding areas of the forest plantation, including communities, infrastructure and sustainable livelihoods of rural communities.

4.2.4.2 *Forest operations*

Principles

- Work carried out in timber plantations throughout the year may increase the risk of fire through operations such as construction and maintenance of infrastructure or roads, harvesting equipment, mechanical site preparation, burning of residue, residue deposition and operational equipment





such as chainsaws. Inappropriate work practices in a forest plantation or conservation area may increase the risk of fire and are largely preventable.

Strategic actions

- Establish or adopt existing guidelines for fire prevention measures while silvicultural and harvesting operations are taking place;
- Use of all equipment and machinery during silvicultural and harvesting operations must be strictly controlled to reduce fire risk.

4.2.4.3 Fire detection, early warning systems and fire hazard rating

Principles

- Fire danger and early warning systems are essential tools for fire prevention. All stakeholders, including timber companies, local communities, landowners and government agencies benefit from advance knowledge of extreme fire danger.
- Fire danger rating (FDR) systems may include weather data and seasonal vegetation conditions whereas fire detection systems may include lookout towers and video imaging.
- Coupled with early warning systems, fire detection systems are essential for the rapid response of firefighting teams before local fires develop into wildfires that are difficult to control.
- Vegetation conditions within and outside plantations, including species suite and undercanopy fuel load substantially affect fire risk.
- Early detection and reporting of fires by lookouts, public and aircraft will limit development and spread of fires.

Strategic actions

- Ensure implementation of current FDR systems for forestry regions, based on land-use, vegetation condition and daily weather data, and underpinned by law;
- Continually assess the effectiveness and appropriateness of existing (local, regional, international) FDR systems used in forestry regions;
- Establish and implement an appropriate national FDR system for forestry regions, based on land-use, vegetation condition and daily weather data, which are tested and evaluated on an ongoing basis, particularly in the aftermath of destructive wildfires;
- Install early warning systems to monitor and track the development of wildfires in the vicinity or region of timber plantations;
- Identify special management zones within a forest plantation considered to be at high risk to fires because of geographical location, wind direction and proximity of grasslands, by means of classification, mapping and assessment of internal and external fire hazard;
- Provide education and awareness training to enhance public participation in early fire detection.

4.2.4.4 Role of communities in fire prevention

Principle

- Many fires in timber plantations and surrounding areas are caused by the activities of rural communities. The successful implementation of any fire management plan to prevent the occurrence of fire relies heavily on the understanding of the social and cultural dynamics of the rural population and their participation and cooperation with plantation managers.

Strategic actions

- Encourage local communities to participate in fire prevention work in the neighbourhood of plantations by creating a sense of ownership and neighbourliness in the spirit of Ubuntu;

- Develop a means to integrate agricultural and community land into the broader fire management plan by demonstrating the benefits to the community;
- Encourage community participation in FPA membership and structures.

4.2.5 Fire mitigation



GOAL: To retard and slow down fire development, thereby preventing uncontrollable fires and subsequent disasters.

4.2.5.1 Forest management and fire mitigation

Principles

- Undercanopy residue and understorey growth and post-harvesting residue are significant, especially in pine stands, coppiced *Eucalyptus* stands and where residue was left unburnt either broadcast or windrowed during previous harvesting operations. This provides a source of fuel during a wildfire but also a large nutrient store for the growing stand.
- Forest management practices comprise a critical component of fire mitigation, e.g. species choice, stand density, compartment design, residue management, undercanopy management and management of unmarketable timber after harvesting.
- Prescribed fires or treatment by chemical or mechanical means are necessary as tools to control the standing biomass of unwanted vegetation (usually alien and/or invasive species) and reduce the fuel load both dead and alive. Prescribed fires in various forms (e.g. applied in natural vegetation such as fynbos or grassland, for slash burning purposes or undercanopy burning) may reduce risks to communities, the forest estate and infrastructure.
- Prescribed burning as a fire mitigation strategy can be used effectively to slow down fire outbreaks, make controlling fire outbreaks easier, thereby preventing wildfires and subsequent disasters.
- Fuel load management must be carried out as part of a balanced environmental plan to sustain long-term site productivity, retain key ecosystem functionality and maintenance and prevent proliferation of invasive plant species and pests and diseases.

Strategic actions

- Review current fire mitigation management strategies with respect to the extent of implementation and effectiveness within forestry regions as part of a holistic integrated system of fire management;
- Develop a regional approach to fire mitigation by incorporating aspects of Integrated Fire Management (IFM) that includes buffer zones, defence breaks, firebreaks and fuel load management strategies, particularly in forest plantation border zones;
- Link to the activities of Rural Disaster Mitigation Committee of the DAFF;
- All fire belts, buffer zones, open areas, fire protection roads, airstrips, training, agreements and tools should be maintained and completed according to a programme and schedule;
- All urban interface areas in close vicinity to plantations must be maintained according to FPA standards and schedules;
- Breaks around infrastructure and high-risk areas in close vicinity to plantations to be completed according to FPA standards and schedules;
- In special management zones, plant species of lower flammability and producing lower fuel loads as well as planting at an appropriate spacing. This includes planting of fire resistant tree species, which can be incorporated into firebreaks and buffer zone units, with or without selected prescribed burning application;
- Construct appropriate firebreaks/buffer zones with consideration of their possible effectiveness and in accordance with the integrated conservation management plan for fynbos, grasslands and other natural fuels;





- Ensure all public areas and conduits such as gas, fuel and oil lines, railway embankments, public roads and power line conduits are kept free of vegetation in forestry regions;
- Carry out an assessment of fuel loads during forest inventories to determine and quantify the danger of fire related to species, stocking and related environment;
- Where appropriate, in forest plantation stands, remove unnecessary undergrowth and understorey from such stands by appropriate means, as part of fuel management programmes. This must be in line with recommended silviculture practices so as not to impact on nutrient levels in the soil;
- Ensure that reducing fuel loads by burning, whether undercanopy or in-field prior to site preparation does not excessively affect air quality or pose a danger to human health;
- Minimise residue after harvesting, especially unmarketable timber. In this respect incentives should be introduced to contractors to ensure clean harvesting operations. This should be done as part of a comprehensive fuel management plan, within the integrated fire management strategy, including landfill and waste management sites;
- Where appropriate, encourage the use of unmarketable timber or logging residue for bioenergy at mills or sawmills or by local communities providing these activities do not increase fire risk as well;
- Remove all combustible material around buildings and homesteads in and around forest plantation areas;
- Monitor and record the results of preplanned burning and use these to revise future operating procedures in the fire management plan.

4.2.5.2 *Fire mitigation in conservation areas within timber plantations*

Principles

- In South Africa, montane grassland, savannah-grassland, fynbos and indigenous forests are important ecosystems and occupy significant portions of the forest estate. In many cases these are recognised as conservation areas. Because fire ecosystems are generally resilient to wildfires, fire plays an important role in their regeneration and must be actively managed for biodiversity and habitat maintenance and to avoid damage to adjacent forest stands. This approach includes considering fire-specific requirements in some ecosystems for the maintenance of biodiversity.
- Management of conservation areas should be conducted with due regard to the value of the conservation area for ecosystem functioning and to prevent proliferation of invasive plant species and pests and diseases.

Strategic actions

- Develop appropriate fire regimes for the grasslands and conservation areas within the forest estate to ensure ecosystem sustainability, and include these in the fire management plans;
- Where necessary, apply prescribed burning on grasslands and fynbos at appropriate intervals and times in the year to prevent damage from wildfires.

4.2.6 **Control and management of fire outbreaks**



GOAL: To ensure efficient and effective rapid response to forest fires and fires threatening forests, and establish protocols for these.

Principles

- Essential to the control and management of fire is early detection, and rapid response/reaction of all firefighting resources.
- Timely intervention and successful control of fire outbreaks will stop the spread of potentially devastating fires and may substantially reduce the area affected by fires.

- The effectiveness of fire attack crews depends to a large extent upon the organisation of the FPAs, quality of firefighting equipment and personnel and the provision of adequate safety equipment.
- Training of both firefighters and managers is a fundamental component of preparedness to control and manage fire outbreaks.
- There is strong dependence on the effectiveness of the fire mitigation and other components of the fire management plan. For the initial attack phase to succeed the successful implementation of other components of the fire management programme is decisive; namely an effective fire management plan, fire prevention measures, detection and local community involvement.
- The tactics to be engaged in initial attack of a fire outbreak are to be followed from the policies outlined in the fire management plan and should be based on expected fire behaviour and the level of preparedness and availability of local firefighting teams.
- Control and management of fire outbreaks should consider the safety of the firefighters and the general public to be paramount.
- Although management of fires that become large or grow into major fire outbreaks is more complex than early mitigation procedures, the management and organisation should be able to adapt fairly quickly to deal with such an outcome.

Strategic actions

- Review all current operating procedures with regard to fire suppression activities, especially with respect to effectiveness of cooperation between various agencies, their roles and responsibilities and standard operating procedures, equipment and infrastructure;
- Draw up regional, provincial and national firefighting contingency plans involving a comprehensive range of stakeholders clearly outlining the responsibilities of the various parties. Plans should:
 - Be based on an ongoing assessment of risk to determine appropriate response and mitigation actions;
 - Consider the role of rural communities in protecting their own assets and contribution and response to initial outbreaks and spread of fires.
- Ensure adequate funding for FPAs, particularly those affecting forestry areas;
- Conduct audits and benchmarking of all FPAs with the objective of sharing best practices;
- Ensure that all firefighters, ground and aerial personnel are provided with state-of-the-art fire-fighting and safety equipment, and are familiar with their responsibilities should a small fire outbreak develop into a large, complex fire;
- Provide adequate training and quality tools to personnel assigned to firefighting duties either as members of the local FPA, WoF or any other service provider;
- Ensure an efficient and functioning communications system which gives appropriate and timely information to those involved in response and initial attack of fire outbreaks, including facilitating the licensing of emergency radio frequencies;
- Train initial attack teams to be able to respond to wider outbreaks of fires that require larger suppression activities. Initial attack organisations should also be trained in non-fire activities such as protecting and evacuating the public should the need arise;
- Establish procedures for dealing with large fire outbreaks based on expected size, duration and complexity, including methods to collect information on aspects of large fires to ensure effective strategy formulation for tackling large fires. An incident command system should be developed to facilitate this;
- Train fire personnel and managers to recognise situations where a large fire outbreak is happening or is likely to develop;
- Develop plans at the beginning of the fire season to allocate responsibilities and resources in the case of multiple fire outbreaks;





- Ensure plantation roads are made according to required standards to act as strategic fire response routes.

4.2.7 Post-incident rehabilitation and restoration



GOAL: To implement a programme that will facilitate the speedy rehabilitation and restoration of timber plantations, including both timber stands and conservation areas (wetlands and grasslands with the forest plantation) that have been damaged as a result of fires.

Principle

- Fire-damaged timber stands represent a large economic loss to a landowner. Some timber will be salvageable but rehabilitation is made more complex by the size of the area affected and the variability of stand damage. Because of reduced vegetative cover and in some cases soil and loss of organic matter, fire-damaged stands and conservation areas are sensitive to further damage from erosive agents such as wind and rain. Properly functioning and sustainable ecosystems should be re-established speedily and effectively.

Strategic actions

- Develop guidelines for landscape planning and design to allow for effective fire management;
- Promote the re-establishment of ecological processes with the restoration of native fauna and flora in both terrestrial and aquatic systems;
- Minimise the spread of invasive plants and animals, pests and diseases after fires;
- Rehabilitate timber stands in an environmentally responsible manner to maximise extraction of economically useful timber while protecting soil and water values;
- Replant and regenerate the site as quickly as possible to protect the soil;
- Plans for rehabilitation should be set out in the land resource plan;
- Provide incentives for speedy rehabilitation and restoration through restoration grants and/or tax concessions, including special dispensations for water-use and other legislative limitations.

4.2.8 Monitoring, assessment and research



GOAL: To develop tools that allow a comprehensive analysis of fire incidences and research factors associated with fire and fire risk.

There are two aspects of this:

- Monitoring and assessment;
- Research.

4.2.8.1 Monitoring and assessment

Principles

- Assessment and monitoring of factors affecting fire risk, fire outbreaks and aftermath of fires is a key component of the fire management plan.
- Monitoring data is essential for critical analysis and evaluation of fire trends, risk and outbreaks which can ultimately result in better planning for fire management.
- Presentation of data in an easily understandable format assists policy formulation, and gains the attention of the public and authorities.
- Monitoring of the effectiveness of the fire management programme is essential to determine whether it is working.

Strategic actions

- Develop a comprehensive plan to assess and monitor all aspects of the fire management programme, including collation of accident reports, near-miss incidents, and a critical review of every aspect of catastrophic fires;
- Collect regular data on the frequency, specific causes and locations of human-induced fires in order to link into an effective fire prevention strategy;
- Build an understanding of actual causes of fires through thorough analysis and statistical trends. This will require standardisation of definitions and a classification of the causes of fires;
- Collect information and data in a systematic and consistent format that allows the use of the information by a wide variety of stakeholders and personnel across regions (e.g. linked to a website);
- Collate information and data to facilitate the measurement of the effectiveness of the fire management programme.

4.2.8.2 Research

Principles

- Scientific research is the foundation for the principles of sound forest fire management, which is a component of sustainable forest management.
- Research into fire behaviour provides fundamental information for developing fire management plans and for understanding the effects of fire on forest ecosystems.
- Research and development on all aspects of fire behaviour and management are powerful tools to enhance international exchange and sharing of knowledge about fires.
- International coordination and cooperation in fire science enables a larger pool of expertise and knowledge to be incorporated into fire management planning.

Strategic actions

- Conduct a literature search of all relevant existing information and initiatives;
- Support universities and research institutions, in cooperation with international partners, to undertake research on fire in forest ecosystems, including the following:
 - Impact on atmosphere, air quality and global climate;
 - Effects on soil ecosystems, biogeochemical cycles and ecological parameters;
 - Effects of forest management systems on fire behaviour;
 - Long-term site productivity of timber plantations;
 - The development of fire behaviour and fire risk and models with respect to ground and atmospheric (weather) conditions conducive to fires;
 - Fuel load inventory and modelling;
 - Socio-economic impact of fire;
 - Rehabilitation of forests affected by fire;
 - Investigation of fire suppression methods;
 - Agroforestry (grazing and crops) as fire management option
 - Fuel load treatment methods;
 - Weed control as fire management tool.
- Create research capacity to address fire management;
- Create a Centre of Excellence/Competence for fire management through a public-private funded partnership (e.g. through NRF);
- Ensure that lessons, principles, research and tools developed by fire management programmes overseas (e.g. Fire Paradox) are adapted and implemented as part of integrated fire management in South Africa.



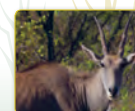


SECTION 5

Other threats

Although the primary focus of this strategy is on threats from insect pests, diseases and fire, these are not the only threats to growing trees in southern Africa. The implementation of the strategy will have to take cognisance of these other threats listed below, and each will have to be evaluated and appropriate mitigating actions developed and implemented. Serious threats from damage-causing animals, such as baboons, have to be addressed and managed through the implementation of this strategy.

Threat	Impact	Mitigating action
<i>Damage-causing animals</i>		
These include a range of indigenous animal pests	Some species have become a nuisance in timber plantations (e.g. rodents, duikers, eland, kudu, bushbuck and baboons). Those with the potential to become a serious threat have been outlined below	A Damage-causing Animals Working Group is currently being established under the Environmental Committee of Forestry South Africa
<i>Animal pests</i>		
BABOON DAMAGE		
Baboons damage trees by stripping the bark	- Severe in pine plantations in Mpumalanga Province. Possibly spreading to other areas - Deformities in the tree, reduction of wood quality and sometimes mortality	Control is difficult and the problem is exacerbated through public perception around primates. A Baboon Working Group has been formed to find solutions to manage the threat
ANTELOPE		
These damage young stands of trees through browsing	Mortality at establishment. Deformities in the tree	Control is difficult. Some preventative treatments are successful (exclusion cages for wattle)
RODENTS		
These damage young stands of trees through ring-barking seedlings at ground level	Mortality from establishment up to third year	Control measures include improved stand hygiene, use of repellents and rodenticides, and biological control (providing raptor perches)
<i>Weeds</i>		
WEEDS IN COMMERCIAL STANDS		
Appropriate and timeous weed control in commercial tree stands implies: - Reduced negative effect on tree growth - Lower dosages and rates of chemical herbicides can be used	Severe in low and mid-altitude sites across the entire forestry area	Constant adherence to best forest management and operation practices





Threat	Impact	Mitigating action
WEEDS AS INVASIVE ALIENS		
Impacts on biodiversity through "escapes" from commercial stands, on water availability, and on access	Severe in sensitive areas (mountain catchments)	- Control through integrated pest management options (combination of cultural, mechanical, chemical and biological control options) - Options for limiting spread of invasive aliens (e.g. development of sterility in tree crops)
<i>Environmental factors</i>		
GLOBAL CLIMATE CHANGE		
Weather extremes (droughts, floods, frost)	The forest industry is dependent on climate, which determines the type and range of tree species which can be planted in an area, and which determines the growth of the trees	Develop likely climate change scenarios for the forestry areas in South Africa. Adapt silvicultural practices to anticipate these changes

Because the scope of this strategy is limited to the timber plantations, the impact of other factors such as illegal logging, timber theft, trade in protected species and poaching are not considered here. The human impact is considered only in the context of fire.



SECTION 6

Implementation of the strategy

6.1 ENCOMPASSING IMPLEMENTATION

Implementation of the NFPS has to be considered in a national and regional context. Although the primary responsibility resides with government, within the mandate of the current Department of Agriculture, Forestry and Fisheries, the successful implementation is dependent on the coordination and collaboration of all of the stakeholders in the forestry sector. Primarily, it is dependent on the commitments made by the public and private sectors as signatories of the Forest Sector Transformation Charter (May 2009).

In the charter there is an undertaking to develop an NFPS to reduce the currently escalating losses being experienced through fires, pests and diseases and other threats. Broad roles and responsibilities for both the public and private sectors are outlined.

The key success factor in implementing the NFPS is the establishment of a Forest Protection Committee comprising the public and private sectors (Fig. 2). This committee would use the strategy and its implementation plans to guide its activities and would have to:

- Establish its terms of reference (from the Forest Sector Transformation Charter) through a formal MoU which should outline the roles and responsibilities;
- Develop priorities in terms of identified risks to the forestry sector;
- Establish and mandate subcommittees to deal with specific, high priority aspects of forest protection;
- Address high priority activities identified through the provision of appropriate resources;
- Report on the state of forest protection to the public and private sector on a regular (at least annual) basis;
- Provide appropriate financial and human resources to enable the committee to effectively carry out its mandate.

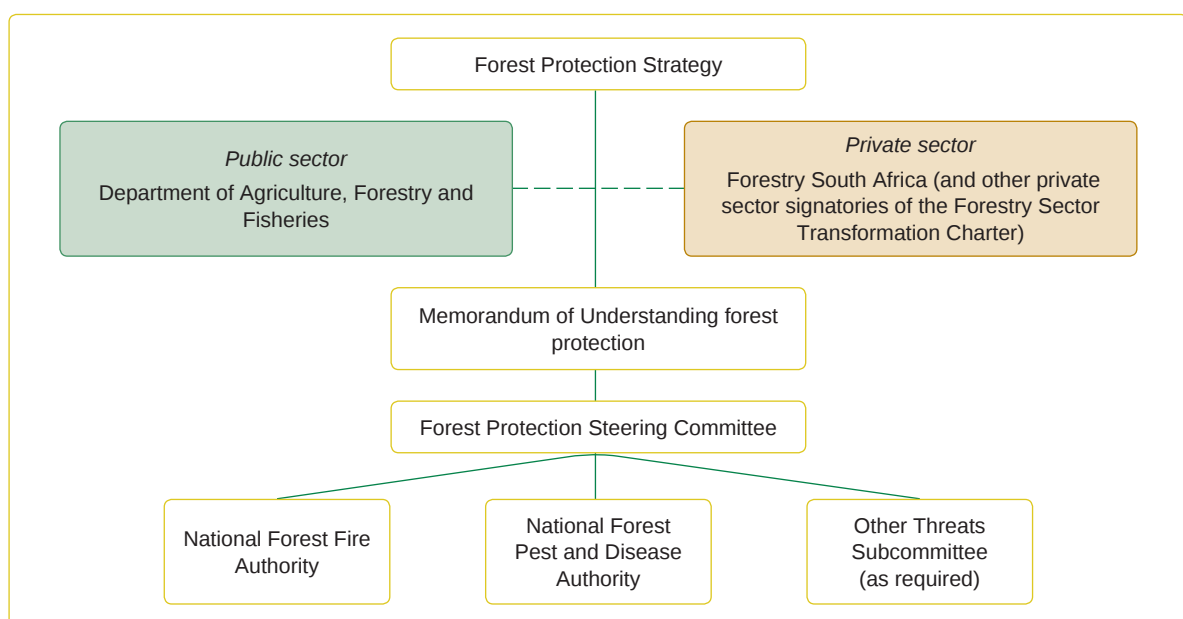


FIG. 2: A proposed structure for the establishment of a National Forest Protection entity for South African forestry



It is proposed that subcommittees (authorities) be established along similar lines for each of the key components of the strategy. At this stage a National Forestry Pest and Disease Authority and a National Forest Fire Authority is proposed. Again these should comprise all key stakeholders in the forestry sector affected by this component. This strategy includes detailed implementation plans for each of the two components (Appendices 1 and 2) and these should be used to guide the component implementation.

There are already many aspects of components of this strategy in place. This strategy aims to provide an encompassing strategic framework at a national level that will align current efforts and identify those areas that have to be expanded. Existing initiatives in forest protection (South African *Sirex* Control Programme, South African Pitch Canker Control Programme, Baboon Damage Working Group, Integrated Pest Management at the ICFR, Working on Fire, Regional Fire Management Committees) should be aligned to, and coordinated by, the National Forest Protection Steering Committee and its subcommittees. In terms of the overall implementation plan, there are eight key areas that are common to both the fire and pest and disease components (table below).

Category	Activity	Responsibility	Priority (short/medium/long term)*
National coordination of forest protection activities	Establish a national function to coordinate forest protection (public-private partnership) through a formal MoU	• DAFF • Private Forestry Sector	Short term
Current structures and functions	Maintain support to current forest protection functions and facilities	• DAFF • Private Forestry Sector	Short term
Review current structures and functions	Conduct a professional, independent review of current approaches to forest protection in South Africa	• Forest Protection Steering Committee	Short term
Monitoring and surveillance	Establish a formal forest protection monitoring network with regular reporting to the public and private sectors	• Forest Protection Steering Committee • Specialised service providers	Short term
Policy and legislation	Review relevant legislation including: • Amend the National Forest Act to include the protection of timber plantations • Expand the Agricultural Pests Act to include pests and diseases affecting timber plantations, and their management and control • Enforce the legislation	• DAFF • Private Forestry Sector • FPOs • Consultants	Medium term
Awareness	Establish high levels of public and stakeholder awareness of forest protection in South Africa	• Forest Protection Steering Committee • Specialised service providers	Medium term
Education and training	Establish relevant education and training for all levels of practitioners in forest protection	• Forest Protection Steering Committee • Specialised service providers	Medium term
Research	Establish and support relevant research programmes to support the requirements for forest protection in South Africa	• Forest Protection Steering Committee • Universities • Research institutes • Science councils	Medium term

* Short term refers to one to two years, medium term is two to five years and long term is more than five years

Appendices

APPENDIX 1

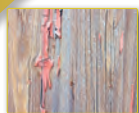
Pest and disease management: Proposed implementation plan

Policy and legislation

Goal	Strategic actions and implementation plan		Responsibility
To ensure that all pest and disease management activities are compliant with and supported by appropriate legislation	- Ensure implementation of all relevant legislation dealing with sustainable plantation forestry, the protection and conservation of native biodiversity - Review all policy to ensure that it is based on best science and experience - Examine the effectiveness of current legislation in providing a clear legal, judicial and policy framework that underpins the formulation of effective pest and disease management plans - Ensure consistency between the various acts that affect the formulation of pest and disease management planning for forests and plantations	Appoint a facilitator and a special and an independent legal task team to evaluate the effectiveness and relevance of the various statutes dealing with pests and diseases, and make recommendations of how current legislation can be improved or amended to provide the necessary policy	- DAFF - DWA and DEA - Consultants
	Develop enforcement protocols and rules and regulations to encourage and facilitate compliance to legislation	- Create a system of incentives to encourage stakeholder participation in pest and disease prevention and management at a local and regional level - Implement penalties for infringement to encourage an enforcement of the acts	- DAFF - DWA and DEA - Consultants

Institutional framework, capacity development and cooperation

Goal	Strategic actions and implementation plan		Responsibility
To develop and strengthen human resource development, technical capacity and cooperation at a regional and national level to ensure an implementation of a national pest and disease policy	Conduct a review of all current infrastructure and human capacity pertaining to pest and disease management and research in South Africa to ensure that shortcomings are addressed effectively	- Conduct an independent cost-benefit analysis of the current South African approach to pest and disease protection in forestry regions critically examining the balance between prevention, eradication, control and management activities - Conduct an independent audit of the extent to which pests and diseases pose a threat to the long-term sustainability of the South African forestry industry	Independent consultants supported by DAFF and the Private Forestry Sector



Institutional framework, capacity development and cooperation (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To develop and strengthen human resource development, technical capacity and cooperation at a regional and national level to ensure an implementation of a national pest and disease policy (cont.)	Ensure adequate funding and infrastructure for task teams to conduct their mandate effectively	Same as for Strategic actions	- DAFF - Private Forestry Sector
	- Strengthen institutional structures at both the regional and national level that are responsible for executing national forest protection policies - Establish an institutional framework responsible for implementing the national pest and disease protection strategy at national, provincial and local levels with sufficient funding, staff, technical skills, equipment and operational procedures - Direct cooperation between all stakeholders to effectively implement the NFPS - Establish bilateral and multilateral agreements on cooperation with respect to pest and disease management planning locally and with respect to the provision of expertise, transfer of technology, and assistance in training internationally	- Engage local communities and the private sector to cooperate in the implementation of national protection strategy - Organise workshops, seminars and field days with all stakeholders to ensure co-ordination, preparedness and effectiveness of operational procedures linked to the national protection strategy - Establish a Pest and Disease Authority to oversee the implementation of the pest and disease component of the NFPS - Create and build on cross-border agreements in the SADC region - Utilise international partners working in pest and disease research and management	- DAFF - Private Forestry Sector - International partners - Universities - Research institutes - Science councils
	Develop capacity and infrastructure for those who will train and instruct forestry researchers, farmers and foresters	Ensure appropriate level of training offered at a relevant tertiary institution	- DAFF - Private Forestry Sector - Universities
	- Maintain an effective pest and disease extension service that provides diagnostic services and holds regular field days with relevant stakeholders - Provide regular communication channels with forest-based communities - Publish regularly, in all relevant print and electronic media, regarding the status of forest pests and diseases in the country - Develop and disseminate relevant information through print and electronic media to all key stakeholders - Design and implement awareness initiatives (e.g. field days) and promote them through specific channels	Same as for Strategic actions	- DAFF - Private Forestry Sector - FABI (diagnostic clinic) - ICFR

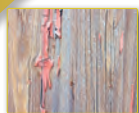
Research

Goal	Strategic actions and implementation plan		Responsibility
To provide appropriate knowledge to ensure an effective and sustainable tree health management	Ensure appropriate research capacity in pests and diseases in South Africa	- Maintain long-term and sustainable research capacity to derive knowledge regarding identification, importance and integrated management of pests and diseases - Support of long-term research on the biology, ecology and genetics of forest pests and pathogens in South Africa through sustained funding to research group/s with a specialisation in this field - Contribute to the development of disease and pest management strategies - Develop appropriate and effective diagnostic tools - Establish screening procedures for disease/pest resistance/tolerance - Identify, develop, test and monitor suitable biological control agents	- DAFF - Private Forestry Sector - Universities - Research institutes - Science councils

Awareness and education

Goal	Strategic actions and implementation plan		Responsibility
To develop knowledge and an understanding of current and potential pest and disease threats and their management among all relevant stakeholders, decision makers and the public	Public education	- Develop a professionally developed pest and disease education programme aimed at ensuring an understanding of the risks caused by the movement of plant material and the benefits of pest and disease management - Design suitable, appropriate and novel curricula on environmental issues, forest and natural resource management as part of education programmes in elementary and secondary schools. This should include basic plant/tree pest and disease components	- DAFF - Private Forestry Sector - Universities
	Forestry contractors, workers and mensuration teams	Design suitable, appropriate and novel curricula on pests and diseases as part of training programmes	- DAFF - Private Forestry Sector - Universities
		Maintain an effective pest and disease extension service that holds regular field days and training sessions with relevant stakeholders	- DAFF - Private Forestry Sector - Research institutes - Universities





Awareness and education (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To develop knowledge and an understanding of current and potential pest and disease threats and their management among all relevant stakeholders, decision makers and the public (cont.)	Forestry contractors, workers and mensuration teams (cont.)	Create web-based “live” map-based database showing past, current pest and disease distributions with real-time updating, linked to an early warning system that notifies interested and affected parties	- DAFF - Private Forestry Sector - Research institutes - Universities
		Train mensuration/monitoring teams in pest and disease recognition and reporting	- DAFF - Private Forestry Sector
	Foresters, farmers and technical managers	- Maintain an effective pest and disease extension service that holds regular field days and training sessions with relevant stakeholders - Support and provide training for extension officers - Extend and develop the capacity of existing functions such as the Diagnostic Clinic at FABI, ICFR website and FABI's TreeHeathNet - Develop and implement specially designed education programmes among new growers in particular - Identify the information and training needs for relevant managers and, where necessary, distribute appropriate materials and conduct seminars, workshops, short courses and field training sessions dealing with the principles and application of pest and disease management - Provide training and conduct courses for quarantine officers, importers and exporters of forestry products and germplasm	- DAFF - Private Forestry Sector - Research institutes - Universities
	Tertiary education	- Introduce tree health courses - Prioritise the ongoing tertiary education programmes to ensure that the Forestry industry has sufficient entomology and pathology professionals to support its research and extension needs	- DAFF - Universities

Monitoring and surveillance

Goal	Strategic actions and implementation plan		Responsibility
To provide and manage comprehensive databases of monitoring information regarding current and future pest and disease threats, both from inside South Africa and outside its borders to enable proper risk assessment and management	Establish a central pest and disease database that is populated from monitoring and surveillance activities:		
	(i) Outside of South Africa's borders	Support a pest and disease awareness team (initiatives) which travels outside South Africa and networks with relevant groups in other/neighbouring countries to identify and monitor possible threats associated with pests and diseases that could affect South Africa	- DAFF - Private Forestry Sector - Universities
	(ii) At ports of entry	Develop trained surveillance personnel to identify plant material infested/infected with pests and pathogens who have full knowledge of import regulations and quarantine requirements	- DAFF - Customs
		Adopt, develop and implement internationally acceptable phyto-sanitary monitoring protocols	DAFF
		Develop and implement adequate and timeous reporting procedures	- DAFF - Private Forestry Sector
	(iii) On forestry estates	Promote knowledge and awareness to all forestry personnel of pest and disease threats in terms of what they are, how to identify them and how to respond	- Private Forestry Sector - Research institutes - Universities - Science councils
		Appoint or designate specific personnel as pest and disease officers and ensure that they form part of the network	- DAFF - Private sector
		Maintain effective communication between forestry personnel and relevant pest and disease support activities	- DAFF - Private Forestry Sector - Research institutes - Universities - Science councils
		Support an in-field pest and disease extension service with trained diagnosticians supported by access to a rapid response centralised diagnostic facility	- Private sector - DAFF - Research institutes - Science councils
		Facilitate knowledge acquisition and training to enable effective monitoring to take place	- DAFF - Private Forestry Sector - Research institutes - Universities - Science councils





Monitoring and surveillance (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To provide and manage comprehensive databases of monitoring information regarding current and future pest and disease threats, both from inside South Africa and outside its borders to enable proper risk assessment and management (cont.)	(iii) On forestry estates (cont.)	Create web-based "live" map-based database showing past and current pest and disease distributions with real-time updating, linked to an early warning system that notifies interested and affected parties	- DAFF - Private Forestry Sector - Research institutes - Universities - Science councils
	(iv) Other high-risk areas	To be decided by the Pest and Disease Monitoring Network as the needs arise and depending on circumstances	

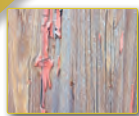
Prevention of pest and disease outbreaks/spread

Goal	Strategic actions and implementation plan		Responsibility
To prevent an introduction of non-native pests and diseases into South African timber plantations and to reduce disease/pest outbreaks, including those arising from host-shifts	(i) Preborder actions		
	Ensure that the risk from non-native pests is assessed regularly, quantified and communicated to all stakeholders	Develop comprehensive databases of information around current and future pest and disease threats from outside the country	- DAFF - Private Forestry Sector - Research institutes
		Make this information readily available to all stakeholders on a regular basis	- DAFF - Private Forestry Sector
		Ensure that border officials are aware of the high-risk pests and diseases	- DAFF - Customs
		Ensure that importers of products that could harbour forest pests and pathogens are aware of and fully comply with both international and national phytosanitary standards and regulations, not only for the products themselves but for packaging material as well	- DAFF - The dti - Private Forestry Sector
	Establish strong international collaborations with other countries to establish accurate lists of potential threats and how to deal with them	- Use trade agreements where applicable - Develop collaboration between appropriate industry and government bodies	- DAFF - Foreign Affairs - The dti - Private Forestry Sector
		Undertake offshore research where potential pest and disease threats exist	- Research institutes - Universities - Science councils

Prevention of pest and disease outbreaks/spread (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To prevent an introduction of non-native pests and diseases into South African timber plantations and to reduce disease/pest outbreaks, including those arising from host-shifts (cont.)	(ii) Border/Ports of entry actions		
	Ensure that adequate monitoring for the introduction of pests and diseases is in place for all ports of entry into South Africa	Ensure that personnel at all relevant border posts are fully appraised and aware of import regulations and quarantine requirements	- DAFF - The dti - Customs
		Ensure adequate monitoring by professionally trained surveillance personnel, at all ports of entry	- DAFF - The dti - Customs
		Establish permanent monitoring sites (e.g. trap trees, insect traps) around major ports of entry for continuous monitoring of pest and pathogen occurrence	- DAFF - Private sector
	Ensure that adequate quarantine facilities are established at all ports of entry to deal with new introductions of pests and diseases	Ensure that adequate quarantine facilities are established at ports of entry	- DAFF - Customs
		Develop policies and legislation to enforce appropriate quarantine guidelines	DAFF
		Ensure adequate response mechanisms to restrict movement of infected and potentially infected material	- DAFF - Customs
		Ensure effective communication and response routes between port of entry personnel, quarantine regulators (i.e. DAFF/dti) and other relevant stakeholders	DAFF
	(iii) Post-border actions		
	Ensure that newly detected pests and diseases are contained at the point of first detection	Develop policies and legislation to enforce appropriate quarantine guidelines to prevent the movement of diseased/infested material from one region to another in the country	DAFF
		- Introduce stringent vehicle and plant material inspection protocols - Amend road transport legislation to legally prevent the movement of goods and vehicles in and out of contaminated areas - Introduce penalties for transgression of road transport legislations - Implement identification and tracing systems to facilitate the tracking of timber consignments to source if these are contaminated - Implement public awareness programmes around transport and vehicle movement restrictions and embargoes	- DAFF - Road Traffic Inspectorate





Prevention of pest and disease outbreaks/spread (cont.)

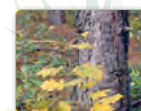
Goal	Strategic actions and implementation plan		Responsibility
To prevent an introduction of non-native pests and diseases into South African timber plantations and to reduce disease/pest outbreaks, including those arising from host-shifts (cont.)	Ensure technical support is available to all timber growers to alleviate the risk of new introductions of pests and diseases	Provide knowledge to all tree growers, particularly emerging farmers, on-site species matching and correct silvicultural practices so as to avoid stress on trees and therefore the formation of areas where pest/pathogen populations can establish and build up	- DAFF - Private Forestry Sector - Research institutes - Universities - Science councils
		Plant genotypes that have been tested for tolerance to pests/pathogens not in the country yet, therefore reducing the chances of establishment when such pests/pathogens enter South Africa	- DAFF - Private Forestry Sector

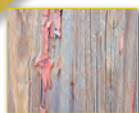
Eradication and prevention of pest/pathogen establishment

Goal	Strategic actions and implementation plan		Responsibility
To prevent newly introduced pests/pathogens from establishing in the country through eradication before spreading occurs over a wide area	All attempts should be made to eradicate the pest or disease when it is first detected. This is highly dependent on early detection	Develop legislation and funding to enforce the destruction of infected material	DAFF
		- Develop specific protocols for responding to new pest and disease infestations and outbreaks, including: - Restricting operations and access in an area - Withdrawing people, vehicles and machinery from the area and disinfection - Implementing interim control or containment measures	- DAFF - Private Forestry Sector
		Establish a "proto team" to react to incursions and coordinate and apply eradication activities, with appropriate technical and financial resources	- DAFF - Private Forestry Sector - Technical experts
		Establish survey teams for early detection of new incursions and for monitoring of the situation after the destruction of infected material	- DAFF - Private Forestry Sector - Technical experts
		Ensure appropriate quarantine response mechanisms to restrict movement of infected and potentially infected material	- DAFF - Private Forestry Sector - Technical experts

Control and management of pests and diseases

Goal	Strategic actions and implementation plan		Responsibility
To reduce the impact of pests and pathogens of trees	Establish control programmes for the high-impact, high-risk pests and diseases. These need to integrate all possible control options in an effective manner	- Control programmes need to address the following options: - Chemical control—mostly in nurseries (government and the industry need to identify and list suitable chemical control measures for high priority pests/pathogens, and put procedures in place for the emergency registration of necessary chemicals that may be unavailable. These must conform to FSC criteria) - Biological control (the lengthy process of obtaining research and/or release permits for biological control agents needs to be addressed) - Implement quarantine procedures - Enforce appropriate sanitation measures - Conduct research on the biology and genetics of pests and diseases - Select and breed tolerant planting stock - Ensure good silviculture	- DAFF - Private Forestry Sector - Universities - Research institutes - Science councils - Service providers
	Ensure high levels of awareness and education of stakeholders on pest and disease outbreaks and control thereof	Through extension, inform forestry personnel of the appropriate actions to reduce the impact and spread of pests/pathogens. Forest protection courses should be a mandatory component of formal forestry education	- DAFF - Private Forestry Sector - Universities - Research institutes - Science councils
		Support education at a tertiary level in forest entomology and forest pathology to ensure long-term availability of pathology and entomology research capacity	Universities
	Ensure that information on outbreaks feeds into the national pest and disease monitoring system	Develop a detailed record-keeping system of pest and disease outbreaks	- DAFF - Private Forestry Sector - Research institutes - Control programmes





Post-incidence rehabilitation and restoration of infected areas

Goal	Strategic actions and implementation plan		Responsibility
To implement a programme that will facilitate a speedy rehabilitation and restoration of forestry areas that have had to be clearfelled and/or taken out of production as a result of being attacked by pests and disease	Develop appropriate protocols to ensure speedy rehabilitation of forestry areas that are severely affected by pests and diseases	Maintain a strong monitoring and surveillance programme for a number of years after the problem has been resolved or eradicated	- DAFF - Private Forestry Sector - Research institutes - Science councils
		Maintain an ongoing rehabilitation research programme supported by an effective extension service to provide support to and advice on best rehabilitation practices	- DAFF - Private Forestry Sector - Universities - Research institutes - Science councils
		Develop national guidelines for the planting of trees to ensure that genotypes that are known to be susceptible to a specific pest or pathogen are not planted in areas where there have been or are likely to have an outbreak and infestation of that particular pest or pathogen	- DAFF - Private Forestry Sector - Research institutes - Science councils
		Ensure that planting conditions and silvicultural practices are such that the potential for the development of tree stress is minimised	- DAFF - Private Forestry Sector - Research institutes - Science councils
		Ensure that all nurseries supplying planting stock to the areas being rehabilitated are fully compliant with all phytosanitary requirements and that the plant material is free of contamination	- DAFF - FSA - Nursery associations - Research institutes
		Provide incentives for speedy rehabilitation and restoration through making restoration grants and/or tax concessions available	- DAFF - FSA

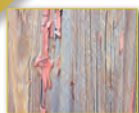
APPENDIX 2

Fire Management: Proposed Implementation Plan

Policy and legislation

Goal	Strategic actions and implementation plan		Responsibility
To ensure that all fire management activities are compliant with and supported by appropriate legislation	Ensure implementation of the relevant Acts, particularly The National Veld and Forest Fire Act (1998), The Fire Brigade Service Act (1987) and The Disaster Management Act (2002)	Empower and support FPAs to implement the key Acts by providing a clear legal mandate for their actions	- DoJ - DAFF - CoGTA (disaster management)
	- Examine the effectiveness of current legislation in providing a clear legal, judicial and policy framework that underpins the formulation of effective fire management plans - Review all policies to ensure that they are based on the best science and experience - Ensure consistency between the various Acts that affect the formulation of fire management planning for timber plantations and surrounding areas - Enact and/or revise national and local laws and regulations regarding the proper use of fire to ensure the effective implementation of fire management policies	Appoint a facilitator and a special and independent legal task team to evaluate the effectiveness of the various Acts dealing with fire protection and to make recommendations as to how current legislation may be improved to provide a consistent policy	- FPAs - DAFF - DoJ - Legal consultants - UFPAs
	- Encourage stakeholder participation in fire prevention and management at a local and regional level - Develop enforcement protocols, rules and regulations to encourage and facilitate cooperation	Review current legislation with respect to incentives for participation in FPAs and UFPAs	- DAFF - DoJ - FPOs - Legal consultants
	Put systems in place to empower FPAs to ensure compliance of Municipalities, Roads Department and Spoornet to the National Veld and Forest Fire Act	Same as strategic action	- DAFF - DoJ - FPOs - Legal consultants
	Create clear legal definitions of fire danger ratings as well as revise the penalties for infringement, so that FPAs are able to enforce the application of the Act	- Review current legislation, enforcement, penalties and legislation to bolster the effectiveness of the FPAs - Ensure prosecution of transgressors of relevant Acts	





Institutional framework, capacity development and cooperation

Goal	Strategic actions and implementation plan		Responsibility
To develop and strengthen human resource development, technical capacity and cooperation at a regional and national level to ensure the implementation of a national fire policy	Conduct a review of all current policies, plans and programmes pertaining to fire management of the forestry regions in South Africa to ensure that they are underpinned by the best tools, experience and are science-based	Conduct an independent cost-benefit analysis of the current South African approach to fire protection in forestry regions, critically examining the balance between prevention, mitigation and suppression activities	- Independent consultants - Supported by DAFF and the Private Forestry Sector
	- Ensure adequate funding for FPAs to conduct their mandate effectively - Identify areas and regions not properly covered by FPAs and take steps to encourage their formation - Ensure that all areas of high risk are adequately protected by an FPA	- Same as strategic actions - Identify areas and regions that are not covered by FPAs, particularly those in high-risk areas - Apply relevant models to identify those areas that are of high risk and check whether existing funding levels of FPAs are adequate or whether there is an FPA in those areas	- DAFF assisted by the Private Forestry Sector - Independent consultants
	- Ensure national, provincial and local cooperation and defined responsibilities for relevant public and government institutions, service providers (e.g. WoF) umbrella, local fire associations (UFPAs and FPAs), local communities, forest companies and NGOs - Strengthen institutional structures at both regional and national levels that are responsible for executing national fire policies - Drive cooperation between local communities, the private sector and NGOs to effectively implement the national fire strategy programme	- Engage local communities, the private sector and NGOs to cooperate in the implementation of the National Fire Protection Strategy - Organise workshops, seminars and field days with all stakeholders to ensure co-ordination, preparedness and effectiveness of operational procedures linked to the national fire protection strategy	- DAFF - UFPAs - FPAs - NGOs (WoF) - DMAs - Private Forestry Sector - Community leaders - MFWC
	Establish an institutional framework responsible for implementing the National Fire Protection Strategy at national, provincial and local levels with sufficient funding, staff, technical skills, equipment and operational procedures	Establish a National Steering Committee to oversee the implementation of the National Forest Fire Protection Strategy. Other working groups such as the Fire Task Team and the Fire Technical Working Group should be sanctioned in this process	- DAFF - FTT - FSC - FSA - FTWG
	Develop capacity and infrastructure for those who will train and instruct firefighters and fire managers	Create a forestry college for firefighting and fire management based at a relevant tertiary institution	- DAFF - NMMU - Private Forestry Sector - MFWC

Institutional framework, capacity development and cooperation (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To develop and strengthen human resource development, technical capacity and cooperation at a regional and national level to ensure the implementation of a national fire policy (cont.)	- Establish bilateral and multilateral agreements on cooperation with respect to fire management planning locally and with respect to the provision of expertise, transfer of technology and assistance in training internationally - Source technical assistance and draw on organisations and personnel from countries with relevant expertise to build capacity and institutions to implement the fire management policies espoused in the National Fire Protection Plan	- Create cross-border agreements with neighbouring countries in the SADC region, particularly Lesotho and Swaziland - Lobby and secure international support in the development of the National Fire Protection Plan through financial assistance, provision of expertise, transfer of technology, assistance in training and the organisation of workshops, seminars and field days - Utilise web portals on international cooperation in fire management	- DAFF - DMAs - UFPAs - FSA

Public awareness, education and training

Goal	Strategic actions and implementation plan		Responsibility
To develop a greater awareness and understanding among the public, rural communities, land-owners, legislators and decision makers of the impact of and risks associated with forest fires, as well as preventive measures associated with these	- Develop a professionally conducted wildfire and forest fire education programme aimed at ensuring an understanding of the risks caused by wildfires and the benefits of fire management in fuel load reduction strategies to mitigate fires - Design suitable, appropriate and novel curricula on environmental issues, forest and natural resource management as part of education programmes in elementary and secondary schools. This should include basic fire management, the effects of fire on ecosystems, economies, safety and human health	Organise and implement national public awareness campaigns on the causes, effects and management of wildfires and forest fires. Information should include the negative effects, both economic and health wise that fire causes for both rural communities and the public engaged in recreation in the countryside	- DAFF - Mass media - FSA - Professional fire management specialists - Consultants - Insurance industry - MFWC - MLILO - University of Stellenbosch
	Conduct basic education programmes for rural communities living near or in the orbit of influence of plantation forests to promote awareness on the importance of the forest environment and the role of fire	- Same as for strategic actions - Assist local communities to engage in activities to support fire prevention and show how this could be a mechanism for local wealth creation, upliftment, poverty alleviation and small business development	- DAFF - Municipalities - FSA - Rural development consultants
	Identify the information and training needs for relevant managers and, where necessary, disseminate appropriate materials and conduct seminars, workshops, short courses and	Develop and conduct training courses for all personnel engaged in fire protection activities such as firefighters up to FPOs	- NMMU/ Saasveld - MFWC - MLILO - University of Stellenbosch





Public awareness, education and training (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To develop a greater awareness and understanding among the public, rural communities, landowners, legislators and decision makers of the impact of and risks associated with forest fires, as well as preventive measures associated with these (cont.)	- field training sessions dealing with the principles and application of forest fire management, including fire prevention and suppression - Identify and recruit suitable members of the community to be trained in fire prevention measures and in the use of techniques and equipment, (including traditional tools), to suppress and manage fires	Provide finance, training and conduct courses for fire extension officers who can conduct basic education programmes in the schools of local communities	- NMMU/ Saasveld - MFWC - MLILO - University of Stellenbosch

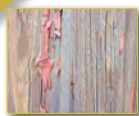
Fire prevention

Goal	Strategic actions and implementation plan		Responsibility
Fire management planning for plantations and conservation areas			
To prevent fires by an efficient, cost-effective fire management programme	• Formulate a fire management plan as part of a comprehensive land-use resource plan that is based on a clear legal framework and consists of a protection, prevention and suppression plan • The plans should: – Include information on land-tenure, threatened assets and communities, spatial fire risk, fire history and fire management measures – Ensure the active participation of all affected stakeholders, local communities, timber companies, landowners and farmers – Be adapted to multiple land-use objectives within the forest estate, i.e. forest compartments, conservation areas, inhabited areas, etc. – Include appropriate fire regimes of fynbos, natural forests and the grasslands, communal and agricultural land in the broader regions in which plantations are present • Fire management activities should not adversely affect the surrounding areas of the forest plantation, including communities, infrastructure and sustainable livelihoods of rural communities	• Develop fire management plans on a regional and local basis that include all aspects such as fire mitigation (fuel-load and vegetation management), firebreaks and buffer zones, fire detection, fire risk and fire hazard management assessment, planning and modes of attack • Define roles and responsibilities for the maintenance of firebreaks near power lines and rail servitudes	• UFPAs • FPAs • Landowners • Private Forestry Sector • Specialist consultants • MFWC • Eskom • Transnet
Forest operations			
	• Establish or adopt existing guidelines for fire prevention measures while silvicultural and harvesting operations are taking place	• Develop Best Operating Practice (BOP) guidelines for fire prevention during silvicultural and harvesting operations, including the use of machinery	• Timber companies and growers • MFWC

Fire prevention (cont.)

Goal	Strategic actions and implementation plan		Responsibility
Forest operations (cont.)			
To prevent fires by an efficient, cost-effective fire management programme (cont.)	The use of all equipment and machinery during silvicultural and harvesting operations must be strictly controlled to reduce fire risk		- Timber companies and growers - MFWC
Fire detection, early warning systems and fire hazard determination			
	Ensure the implementation of current FDR systems for forestry regions, based on land-use, vegetation condition and daily weather data	- Create capacity and proper mechanisms for effective implementation of the FDR system - Identify what mechanisms are required to make these systems function properly and effectively	- DAFF - SA Weather Service - Academic institutions
	Ensure that the implementation of current FDR systems is underpinned by law	Define clearly the application of, and definitions in the FDR system and the consequences of non-compliance	- DoJ - DAFF
	- Continually assess the effectiveness and appropriateness of existing (local, regional, international) fire danger rating (FDR) systems used in forestry regions - Test and evaluate the FDR system on an ongoing basis, particularly in the aftermath of destructive wildfires	- Conduct an independent and professional evaluation of the effectiveness and appropriateness of existing FDR systems used in forestry regions - Evaluate the effectiveness and appropriateness of proposed FDR systems used in forestry regions	- DAFF - Academic institutions - Relevant scientists - Consultants
	Install early warning systems to monitor and track the development of wildfires in the vicinity or region of timber plantations	Same as strategic actions	- UFPAs - Service providers
	Identify special management zones within a forest plantation considered to be at high risk to fires because of geographical location, wind direction and proximity of grasslands, by means of classification, mapping and assessment of internal and external fire hazard	Develop a consistent methodology to assist in the classification, mapping and assessment of internal and external fire hazard. This should be integrated with the Veldfire Risk Classification	- Independent consultants - Private Forestry Sector - Academic research institutions
Role of communities in fire prevention			
	- Encourage local communities to participate in fire prevention work in the neighbourhood of plantations by creating a sense of ownership and neighbourliness in the spirit of Ubuntu - Develop a means to integrate agricultural and community land into the broader fire management plan by demonstrating benefits to the community - Encourage community participation in FPA membership and structures	Conduct workshops and field days with local communities to show the benefits of participation in fire prevention	- DAFF - Rural development consultants - UFPAs





Fire mitigation

Goal	Strategic actions and implementation plan		Responsibility
Forest management and fire mitigation			
To retard and slow down fire development, thereby preventing uncontrollable fires and subsequent disasters	Review current fire mitigation management strategies with respect to an extent of implementation and effectiveness within forestry regions as part of a holistic integrated system of fire management	Conduct an independent and professional review of the effectiveness of current fire mitigation strategies across all land tenures within forestry regions	Independent consultants
	- Develop a regional approach to fire mitigation by incorporating aspects of Integrated Fire Management (IFM) that includes buffer zones, defence breaks, firebreaks and fuel load management strategies, particularly in forest plantation border zones - All fire belts, buffer zones, open areas, fire protection roads, airstrips, training agreements and tools should be maintained and completed according to a programme and schedule - All urban interface areas in close vicinity to plantations must be maintained according to FPA standards and schedules. - Breaks around infrastructure and high risk areas in close vicinity to plantations to be completed according to FPA standards and schedules - In special management zones, plant species of lower flammability and producing lower fuel loads, as well as planting at an appropriate spacing. This includes planting of fire resistant tree species, which can be incorporated into firebreaks and buffer zone units, with or without selected prescribed burning application - Construct appropriate firebreaks/ buffer zones with consideration to their likely effectiveness and in accordance with the integrated conservation management plan for fynbos, grasslands and other natural fuels	- Develop an Integrated Fire Management Strategy for all forestry regions, including guidelines for buffer zones, defence breaks, firebreaks, fuel load management strategies and identification of vulnerable plantation border zones (see below) - Develop detailed guidelines for fire mitigation practices, such as fire resistant tree species, tree species of lower flammability and producing lower fuel loads, appropriate spacing, etc.	- Independent consultants - Private Forestry Sector - DAFF - Academic research institutions
	Carry out an assessment of fuel loads during forest inventories to determine and quantify the danger of fire related to species, stocking and related environment	Develop standard policies and procedures for evaluating fuel load types and quantities during forest inventories	- Independent consultants - Academic research institutions - Private Forestry Sector

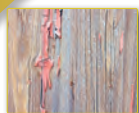
Fire mitigation (cont.)

Goal	Strategic actions and implementation plan		Responsibility
Forest management and fire mitigation (cont.)			
To retard and slow down fire development, thereby preventing uncontrollable fires and subsequent disasters (cont.)	In all forest plantation stands, remove unnecessary undergrowth and understorey from such stands by appropriate means, as part of fuel management programmes	Create standards, policies and procedures based on degree of undergrowth, spacing and species for removal of unnecessary vegetation	- Private Forestry Sector - Landowners
	Ensure that all public areas and conduits such as railway embankments, public roads and power line conduits are kept free of vegetation in forestry regions	Conduct routine maintenance of all public transportation routes and power lines in terms of vegetation clearance	- Department of Transport - Municipalities - Eskom - Spoornet
	Ensure that reducing fuel loads by burning, whether under-canopy or in-field prior to site preparation does not excessively affect air quality or pose a danger to human health	Conduct in-field or undercanopy burning in a controlled manner in appropriate weather conditions by trained personnel	- Private companies - Landowners
	- Minimise wastes after harvesting, especially non-merchantable timber. In this respect, incentives should be introduced to contractors to ensure clean harvesting operations. This should be done as part of a comprehensive fuel management plan, as part of the Integrated Fire Management Strategy - Where appropriate, encourage the use of non-merchantable timber or logging residue for bio-energy at mills or sawmills or by local communities provided that these activities do not increase fire risk as well	Develop protocols and standards to minimise waste after harvesting according to product, species and type of harvesting operation and incorporate into integrated fire management strategy	- Private companies - Landowners - Consultants - Academic research institutions
	Remove all combustible material around buildings and homesteads in and around forest plantation areas	Same as strategic actions	
	Monitor and record the results of preplanned burning and use these to revise future operating procedures in the fire management plan	Same as strategic actions	

Fire mitigation in conservation areas within timber plantations

Goal	Strategic actions and implementation plan		Responsibility
To combat fires in conservation areas within timber plantations	- Develop appropriate fire regimes for the grasslands and conservation areas within the forest estate to ensure ecosystem sustainability - Where necessary apply prescribed burning on grasslands and fynbos at appropriate intervals and times in the year to prevent damage from wildfires	Develop guidelines for fire regimes of the various grassland types to be incorporated into the Integrated Fire Management Strategy	- Consultants - Academic research institutions - Private Forestry Sector





Control and management of fire outbreaks

Goal	Strategic actions and implementation plan		Responsibility
To ensure efficient and effective rapid response to forest fires and fires threatening forest, and establish protocols for these	Review all current operating procedures with regard to fire suppression activities, paying particular attention to the effectiveness of cooperation between various agencies, their roles and responsibilities and standard operating procedures	Conduct a professional and independent audit of the current operating procedures with regard to fire suppression activities, paying particular attention to the effectiveness of cooperation between various agencies, their roles and responsibilities and standard operating procedures	Independent consultants
	Draw up regional, provincial and national firefighting contingency plans involving a comprehensive range of stakeholders, clearly outlining the responsibilities of the various parties. Plans should be based on an ongoing assessment of risk to determine appropriate response and mitigation actions, including early detection systems, infrastructure, equipment and standards, and should consider the role of rural communities in protecting their own assets and contribution and response to initial outbreaks and spread of fires	Same as the strategic actions	- DAFF - FPAs - Service providers (WoF) - Community organisations - MFWC
	Ensure that all firefighters (ground and aerial) are provided with state-of-the-art firefighting and safety equipment	Same as the strategic actions	- UFPAs - Service providers (WoF) - Private Forestry Sector
	- Ensure that all fire attack crews are familiar with their responsibilities should a small fire break out and then develop into a large, complex fire - Provide adequate training and quality tools to personnel assigned to firefighting duties either as members of the local FPA, WoF or any other service provider - Train fire personnel and managers, emphasising recognition of situations where a large fire outbreak is happening or is likely to develop. Ensure the preparedness of the initial attack team to wider outbreaks of fires that require larger suppression activities - Initial attack organisations should be trained for non-fire activities, such as protecting and evacuating the public should the need arise	- Provide finance, training and conduct courses for all personnel engaged in firefighting activities, covering the wide range of scenarios that firefighters and managers are likely to face - Develop capacity and infrastructure for those who will train and instruct firefighters and fire managers (see Section 4.2)	- DAFF - UFPAs - Service providers (WoF) - NMMU

Control and management of fire outbreaks (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To ensure efficient and effective rapid response to forest fires and fires threatening forest, and establish protocols for these (cont.)	Develop an efficient and functional communications system which gives appropriate and timely information to those involved in response and initial attack of outbreaks of fire	- Develop an incident command system (ICS) to facilitate this - Facilitate the licensing of emergency radio frequencies	- UFPAs - FPAs - DMAs - Service providers (WoF) - ICASA
	- Establish procedures for dealing with large fire outbreaks based on expected size, duration and complexity. This should include methods to collect information on aspects of large fires to ensure effective strategy formulation for tackling large fires - Develop plans at the beginning of the fire season to allocate responsibilities and resource allocation in the case of multiple outbreaks - Ensure that plantation roads are made according to the required standards to act as strategic fire response routes	- Liaise with the SANDF regarding the use of aircraft and other equipment in the event of large outbreaks of fire - Same as the strategic actions	SANDF

Post-incident rehabilitation and restoration

Goal	Strategic actions and implementation plan		Responsibility
To implement a programme that will facilitate the speedy rehabilitation and restoration of forest plantations, including both timber stands and conservation areas (wetlands and grasslands within forest plantations) that have been damaged by fires	Develop guidelines for landscape planning and design to allow effective fire management	Redesign landscape from risk management point of view, including fire buffer zones, breaks, compartment layout, etc.	- Landowners - Independent consultants - MPWC - FPAs
	- Promote the re-establishment of ecological processes with the restoration of native flora and fauna - Minimise the spread of invasive plants and animals, pests and diseases after fires - Rehabilitate timber stands in an environmentally responsible manner to maximise extraction of economically useful timber while protecting soil and water values - Replant and regenerate the site as quickly as possible to protect the soil - Plan for rehabilitation set out in the land resource plan - Provide incentives for speedy rehabilitation and restoration through restoration grants and/or tax concessions	Same as the strategic actions	- DAFF - Landowners





Monitoring, assessment and research

MONITORING AND ASSESSMENT

Goal	Strategic actions and implementation plan		Responsibility
To develop tools that allow a comprehensive analysis of fire incidences and research factors associated with fire and fire risk	Build an understanding of actual causes of fires through thorough analysis and statistical trends	Undertake an independent and expert critical review and analysis of historical trends and causes of forest fires	Independent consultants
	Develop a comprehensive plan to assess all aspects of the fire management programme, including collation of accident reports, near-miss incidents and a critical review of every aspect of catastrophic fires	Same as for strategic actions	- DAFF - FPAs - ICFR - Independent consultants
	- Regular data should be collected on the frequency, specific causes and locations of human-induced fires in order to link into an effective fire prevention strategy - Collect information and data in a systematic and consistent format that allows the use of the information by a wide variety of stakeholders and personnel across regions - Collate information and data to allow measurement of the effectiveness of the Fire Management Programme	- Establish and construct a central database for the recording and collation of all fire outbreak data, including accident reports, near-miss incidents, area affected, injuries and FPA reports and allow access via the web - The database should be constructed in such a way to allow easy analysis and review of all data and access to the public (e.g. linked to a website) - Conduct a yearly review of all fire statistics, including all pertinent information as a basis for refining and improving all aspects of the National Forest Fire Protection Strategy, including policies, capacity building, public awareness, fire prevention, managing outbreaks, etc.	DAFF

RESEARCH

Goal	Strategic actions and implementation plan		Responsibility
To develop tools that allow a comprehensive analysis of fire incidences and research factors associated with fire and fire risk	- Support universities and research institutions, in cooperation with international partners, to undertake research on forest ecosystems, including the following main areas of interest: - Impact on atmosphere, air quality and global climate - Impact on atmosphere, air quality and climate - Effects on soil ecosystems, biogeochemical cycles and ecological parameters - Effects of forest management systems on fire behaviour	Government and industry should enter into a partnership via funding agencies such as THRIP and NRF to support and prioritise such research at a post-graduate level. In this respect, a three-year research strategy should be developed and implemented and funded accordingly	- DAFF - NRF - THRIP - ICFR - NMMU

RESEARCH (cont.)

Goal	Strategic actions and implementation plan		Responsibility
To develop tools that allow a comprehensive analysis of fire incidences and research factors associated with fire and fire risk (cont.)	– Fire and long-term site productivity of timber plantations – Development of fire behaviour and fire risk and models with respect to ground and atmospheric (weather) conditions conducive to fires – Fuel load inventory and modelling – Socio-economic impact of fire – Rehabilitation of forests affected by fire – Investigation of fire suppression methods (Including development and testing/use of chemicals) – Agroforestry (grazing and crops) as fire management option – Fuel load treatment methods – Weed control as fire management tool		• DAFF • NRF • THRIP • ICFR • NMMU
	• Create research capacity to address the fire management issues raised previously	• Create a Centre of Excellence for fire management in a public-private funded partnership	• DAFF • NRF • THRIP • ICFR • NMMU
	• Ensure that lessons, principles, research and tools developed by fire management programmes overseas (e.g. Fire Paradox) are adapted and implemented as part of an Integrated Fire Management System in South Africa	• Develop a database of material (publications and software) from relevant overseas projects. • Condense relevant components of this information and make available to relevant agencies involved in fire protection management in South Africa	• ICFR • NMMU • Independent consultants





Glossary

(With recognition to ITTO, 1997; Owen, 2000; Goldammer and De Ronde, 2004; DWAF, 2005; FAO, 2006; IUFRO Website: www.iufro.org/science/special/silvoc)

Biological control (Bio-control)

The method of controlling pest species using a living organism, an important component of integrated pest management (IPM) programmes.

Bio-security

Encompassing all policy and regulatory frameworks to manage risks, including relevant environmental risks, which are associated with food and agriculture, fisheries and forestry. Bio-security is a set of preventive measures designed to reduce the risk of transmission of infectious diseases, quarantined pests, invasive alien species, as well as living modified organisms. In the context of this strategy, this should therefore include pests and diseases and fire.

Damage-causing animals

Animals, usually excluding insect pests, which cause damage to planted crops (trees).

Disaster Management Centre (DMC)

Entity provided for by the Disaster Management Act, to facilitate an integrated and coordinated system of disaster management with an emphasis on prevention and mitigation by all stakeholders.

Fire danger rating (FDR)

A component of a fire management system that integrates the effects of selected fire danger factors into one or more qualitative or numerical indices of current protection needs.

Fire management

The discipline of using fire to achieve land management and traditional use objectives, together with the safeguarding of life, property and resources through the prevention, detection, restriction, control and suppression of fire in forest and other vegetation in rural areas.

Fire mitigation

To lessen or reduce the effects or spread of a wildfire by undertaking certain measures such as fuel load reduction, firebreaks as part of an integrated fire management plan.

Fire prevention

This refers to all measures in fire management, forest management, forest utilisation, concerning the land users and the general public, which may result in the prevention of fire outbreaks or the reduction in their severity and spread.

Fire Protection Association (FPA)

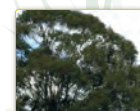
An association registered in terms of Chapter 2 of the National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998).

Forest industry

All activities that contribute to the processing of standing trees into finished products.

Forest health

The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function and vigour, presence of unusual levels of insects or disease and resilience to disturbance. Forest health is a measure of a forest ecosystem's capacity to supply and allocate water, nutrients and energy in ways that increase or maintain ecosystem productivity while maintaining resistance to biotic and abiotic stresses.



**Forest protection**

Protection, improvement and use of natural resources according to principles that will ensure their highest economic and social use.

Forestry

"The science and practice of managing forests, woodlands, timber plantations, trees and associated non-tree natural resources, to attain their specific optimum yield of products and services for human benefit, but yet ensuring their diversity, vitality and productivity on a sustained basis" (Owen, 2000).

Fuel

All combustible organic material in forests and other vegetation types, including agricultural biomass, grasses, branches and wood which create heat during the combustion process.

Incident Command System (ICS)

An on-scene emergency management concept to allow its users to adopt an integrated operational management structure equal to the complexity and demands of single or multiple incidents or outbreaks of fire without being hindered by jurisdictional boundaries.

Insect pests

Pests referred to are insect pests that attack and infest plants, in this case commercial tree species.

Integrated fire management (IFM)

Designation of fire management systems that include i) integration of planned application of fire in forestry or other land-use systems in accordance with the objectives of prescribed burning and ii) integration of the activities of rural communities, government agencies, private landowners and NGOs to meet the overall objectives of land management pertaining to forest fire protection.

Plant diseases

A condition/factor that reduces the health of the plant by interfering in its normal functioning.

South African Forest Sector Transformation Charter

A commitment made by the public and private sectors to achieve transformation of the forestry sector in South Africa (see Appendix 3).

Preparedness

All activities undertaken in advance of wildfire occurrence to decrease wildfire severity and to ensure effective fire suppression.

Prescribed burning

The controlled application of fire to live or dead vegetation under specified environmental conditions which allow the fire to be confined to a predetermined area to achieve planned resource or fire management objectives.

Timber plantations

Trees usually of a single species planted on cleared land for the purpose of growing a product such as wood.

Umbrella Forest Protection Association

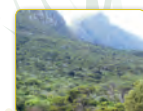
An entity provided for the Disaster Management Act, where several Forest Protection Associations (FPAs) would benefit from shared services or organisation.

Wildfire

Any unplanned and uncontrolled wildland fire that, regardless of ignition source, may require suppression response or other action.

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