

SGS GENERIC

FOREST MANAGEMENT STANDARD FOR ZAMBIA

2011

This checklist presents the SGS Generic standard for forest certification against the FSC Principles and Criteria. This standard forms the basis for:

- Development of a regional standard
- Scoping assessment
- Certification assessment
- Surveillance assessment
- Information to stakeholders on the assessment criteria used by SGS

PHYSICAL ADDRESS		International	Local
		SGS Société Générale de Surveillance SA 1, place des Alpes P.O. Box 2152 CH-1211 Geneva 1 Switzerland	SGS South Africa (Pty) Ltd Building 1, Huawei Office Park Western Service Road Woodmead, Johannesburg, 2191 South Africa
CONTACT	Person:	Natalia Marius	Stuart Charlton
	Telephone:	+598.2.600.3.600 +598.95.02.00.86	+27 11 800 1000 +27 82 604 5877
	Email :	forestry@sgs.com	stuart.charlton@sgs.com
	Web address:	http://www.agriculture-food.sgs.com/en/Forestry/	https://www.sgs.co.za

CHANGES SINCE THE PREVIOUS VERSION OF THE STANDARD

Section	Change	Date
1 st page	Updated addresses and contact information	23.10.2022

ADAPTATION OF STANDARD TO MEET LOCAL REQUIREMENTS AND THRESHOLDS

The objective of local adaptation of the SGS Generic standard is to:

- i. identify any aspects of the standard that may be in conflict with legal requirements in the area in which the standard is to be used, and if such a conflict is identified shall evaluate it for the purposes of certification in discussion with the involved or affected parties. Conflict only occurs where a legal obligation *prevents the implementation of* some aspect of the generic standard. It is not considered a conflict if the requirements of the generic standard exceed the minimum requirements for legal compliance;
- ii. identify any aspects of its generic standard, which specify performance thresholds lower than the minimum legal requirement in the country concerned. If any such differences are identified the relevant thresholds shall be modified to ensure that they meet or exceed the minimum national requirements.
- iii. add specific indicators (with appropriate means of verification if required) and/or cross-references to the identified documentation to evaluate compliance with key requirements of the national and local forest laws, administrative requirements and multi-lateral environmental agreements related to the FSC Principles 1 - 10.
- iv. take account of the national context with regards to forest management;
- v. take account of national environmental, social and economic perspectives;
- vi. ensure that the standard is applicable and practical in the country concerned;
- vii. ensure that the standard is applicable and practical to the size and intensity of management of the Forest Management Unit concerned;
- viii. address specific issues that are of general concern to any stakeholder group in the country concerned.

SGS is not required to seek or develop a consensus with regard to the modification of our generic standard. SGS will however make meaningful accommodation of stakeholder concerns and will be guided in this by:

- i. our knowledge of the indicators and means of verification that have been included in other, FSC-accredited, regional, national or sub-national standards, with regard to the issues raised;
- ii. advice provided in writing by the FSC National Initiative in the country concerned as to the likelihood that a proposed modification would have the support of the majority of the members of each chamber of an FSC working group active in that country;
- iii. advice provided in writing by an FSC Regional Office covering the country concerned, as to the likelihood that a proposed modification would have the support for the majority of FSC members of each chamber in the region.
- iv. the scale and intensity of forest management.

SGS should be able to demonstrate that the requirements of the locally adapted generic standard are broadly in line with the requirements of other FSC-accredited national standards applicable to similar forest types in the region, and with any guidance received from an FSC National Initiative in the country concerned.

SGS is not required to make further changes to the locally adapted standard used for an evaluation during the period of validity of the certificate except as necessary to bring it into compliance with any FSC Policies, Standards, Guidance or Advice Notes subsequently approved by FSC.

LAYOUT OF THE STANDARD:

The standard follows the FSC Principles and Criteria of Forest Stewardship (January, 2000). The Standard is divided into 10 sections, each corresponding to one of the FSC principles with the criteria listed underneath each principle. Refer to the diagramme on the next page for further clarification.

Each page of the standard is divided into 3 columns. The standard also serves as the checklist that is used during an assessment and for every criterion the following is provided:

The Generic Requirement: Indicator All local adaptations or additions are indicated in red.	This outlines the norm or indicators that Qualifor requires for compliance with the specific FSC criterion. A potential source of information or evidence that allows an auditor to evaluate compliance with an indicator. Some indicators make a distinction between the requirements for "normal" forests and SLIMF operations (Small and Low Intensity Managed Forests).
Verifiers	Verifiers are examples of what the SGS assessor will look for to ascertain if the specific norm or indicator has been met. This list is not exhaustive and the assessor may use other means of verifying the relevant indicator.
Guidance	Guidance is written in <i>italics</i> and assists the assessor in understanding the requirement of the specific indicator.

The FSC Principle

PRINCIPLE 1. COMMUNITY RELATIONS AND WORKER'S RIGHTS:	
Forest management operations shall maintain or enhance the long-term social and economic well being of forest workers and local communities.	
Criterion 4.1:	The communities within, or adjacent to, the forest management area should be given opportunities for employment, training, and other services
Indicator 4.1.6	Verifiers & Guidance:
Policies and procedures and the implementation thereof make qualifications, skills and experience the basis for recruitment, placement, training and advancement of staff at all levels	<i>No evidence of discrimination on the basis of: race, colour, culture, sex, age, religion, political opinion, national extraction or social origin</i>
SLIMF:	Employment policies and procedures.
Employees are not discriminated in hiring, advancement, dismissal remuneration and employment related to social security	Interviews with Forest Managers, workers and Labor Union representatives.
	SLIMF:
	Interviews with workers and contractors

The FSC Criterion

An SGS Guideline (Italics)

The SGS verifier

The SGS observation i.t.o. the indicator

The SGS Indicator

The year of the evaluation

THE STANDARD

PRINCIPLE 1. COMPLIANCE WITH LAWS AND FSC PRINCIPLES:

Forest management shall respect all applicable laws of the country in which they occur and international treaties and agreements to which the country is a signatory, and comply with all FSC Principles and Criteria

Criterion 1.1 Forest management shall respect all national and local laws and administrative requirements

Indicator 1.1.1	Verifiers & Guidance:
<p>There is no evidence of significant non-compliance with all national and local laws and administrative requirements</p> <p>1.1.1.1: A valid concession license is available and all of the conditions of the licence are met (Applicable to harvesting in natural forests/woodlands).</p>	<p>Interviews with and information supplied by regulatory authorities, other stakeholders and Forest Managers.</p> <p>Control of required legal documentation, policies, operational procedures and standards demonstrate compliance with requirements.</p> <p><u>SLIMF:</u></p> <p>The forest manager knows what the legislation requires.</p> <p>Field observation and documentation available show that legislation is being complied with in-field.</p> <p><i>A legal non-compliance will be considered "significant" if:</i></p> <ol style="list-style-type: none"> <i>it has been allowed to persist or remain for a period of time that would normally have allowed detection; and/or</i> <i>it is an intentional or a blatant/self-evident disregard for the law.</i> <p><i>A legal non-compliance will not be considered "significant" if the deviation is short-term, unintentional and without significant damage to the environment.</i></p> <p><i>The issuance of a concession license is subject to the production of a valid Environmental Impact Assessment by the Licensee.</i></p> <p><i>See Appendix A for a list of all the applicable laws, regulations and guidelines</i></p>
Indicator 1.1.2	Verifiers & Guidance:
<p>Forest managers shall demonstrate awareness and compliance with relevant codes of practice, operational guidelines and other accepted norms or agreements.</p> <p>1.1.2.1 In the case of a concession, the following must apply:</p> <ul style="list-style-type: none"> <i>The licensee must measure and record every timber log removed from the compartment and the Forest officer must mark one end of the log.</i> <i>The licensee must submit returns of his logging on the 5th day of every month. These returns must show the number of trees, volume and number of logs by tree species removed from the compartment. The compartment number is recorded.</i> 	<p>Interviews with Forest Managers and field observations.</p> <p>List of applicable laws, regulations and national guidelines.</p> <p><i>There is awareness of the Lozi Tribal Common Law (Barotse Royal Establishment) in the Western Province of Zambia. In terms of this Tribal Law, the following is emphasized:</i></p> <ul style="list-style-type: none"> <i>The cutting of fruit trees is prohibited</i> <i>Charcoal making is prohibited, as a result there is no official charcoal making in the Western Province.</i> <i>Special species of trees are protected</i> <p><i>See Appendix A for a list of all the applicable laws, regulations and guidelines</i></p>

<p>▪ <i>All sawn timber must be hammer marked by a Forest Officer before being removed from the sawmill site.</i></p>	
<p>Criterion 1.2 All applicable and legally prescribed fees, royalties, taxes and other charges shall be paid</p>	
<p>Indicator 1.2.1</p> <p>There is evidence that required payments have been made.</p>	<p>Verifiers & Guidance:</p> <p>Invoices, tax returns, receipts.</p> <p>Interviews with and information supplied by regulatory authorities and other stakeholders.</p> <p>No evidence of non-payment</p> <p><i>In the case of concessions, the License fees and all royalty fees are to be paid before cutting commences.</i></p>
<p>Indicator 1.2.2</p> <p>Provision has been made to meet the costs of future fees</p>	<p>Verifiers & Guidance:</p> <p>Specific provisions in financial planning and long-term budgets.</p> <p><u>SLIMF:</u></p> <p>Forest manager can explain how future costs will be provided for.</p>
<p>Criterion 1.3 In signatory countries, the provisions of all the binding international agreements such as CITES, ILO conventions, ITTA, and Convention on Biological Diversity, shall be respected.</p>	
<p>Indicator 1.3.1</p> <p>There is awareness and implementation of the requirements of the Convention of International Trade in Endangered Species (CITES) and controls in place to ensure continuing compliance with such</p> <p><u>SLIMF:</u></p> <p>There is awareness of any local species that are covered by the requirements of the Convention of International Trade in Endangered Species (CITES) and controls in place to ensure continuing compliance with such</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers</p> <p>Operational documentation</p> <p>Required licenses are in place</p> <p><i>Zambia has been party to CITES since 1980. In enhancing Zambian Wildlife Authority (ZAWA) performance on CITES matters, the ZAWA Board approved the creation of a National CITES Secretariat (NACS), composed of various scientific and law enforcement agencies.</i></p> <p><i>Proof of access to CITES listed species.</i></p>
<p>Indicator 1.3.2</p> <p>Forest Managers are aware of the requirements and have implemented controls to ensure continuing compliance with the International Labour Organisation (ILO) conventions that apply to their operations. ILO 87 and 98 are minimum requirements for certification.</p> <p><u>SLIMF:</u></p> <p>Forest Managers are aware of and have implemented controls to ensure continuing compliance with national legislation relating to labour matters</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers, workers, contractors, labour unions and regulatory authorities.</p> <p>Review of policies, procedures and personnel records.</p> <p><u>SLIMF:</u></p> <p>Forest Managers are aware of the requirements and there is no objective evidence of non-compliance.</p> <p><i>Zambia is a signatory to ILO.</i></p> <p><i>Proof of access to ILO conventions. Copies of the ILO documents 87, 98 and ILO Code of Practice on Safety and Health in Forestry Work (ILO1998) should be available.</i></p>

Indicator 1.3.3	Verifiers & Guidance:
(Not applicable to SLIMF) Forest Managers are aware of the requirements and have implemented controls to ensure continuing compliance with ITTA.	Interviews with Forest Managers, regulatory authorities and other stakeholders. Review of policies, procedures and records <i>Zambia is signatory to the International Tropical Timber Agreement (ITTA) and a member of the organisation (ITTO). Members are encouraged to support and develop industrial tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interest of local communities dependent on forest resources</i>
Indicator 1.3.4	Verifiers & Guidance:
(Not applicable to SLIMF) Forest Managers are aware of the requirements and have implemented controls to ensure continuing compliance with the International Biodiversity Convention.	Interviews with Forest Managers, regulatory authorities and other stakeholders. Review of policies, procedures and records. <i>Zambia is a signatory to International Biodiversity Convention (CBD). CBD in Zambia is spearheaded by the Ministry of Tourism, Environment and Natural Resources. ZAWA implements the convention through the identified focal point within ZAWA.</i>
Criterion 1.4	Conflicts between laws, regulations and the FSC Principles and Criteria shall be evaluated for the purposes of certification, on a case-by-case basis, by the certifiers and the involved or affected parties
Indicator 1.4.1	Verifiers & Guidance:
Any identified conflicts are brought to the attention of SGS and involved or affected parties.	SGS will assess the conflict and advise on resolution thereof, where such were possible. Interviews with Forest Managers and other stakeholders. <i>Potential Conflicts between National Law and Tribal Law (especially in the Western Province) must be checked. For example, under the Lozi Tribal Law, charcoal making is prohibited, but it is permitted, when authorised, under the Forest Law. FSC P&C support both, therefore precedence needs to be investigated on a case by case basis.</i>
Criterion 1.5	Forest management areas should be protected from illegal harvesting, settlement and other unauthorised activities
Indicator 1.5.1	Verifiers & Guidance:
Forest Managers have taken reasonable measures to monitor, identify and control illegal harvesting, settlement and other unauthorised activities.	Field observations show no damage from unauthorised or illegal activities Manager's explanation of protection/ prevention activities e.g. signs, gates, patrols, etc Copies of reports made to the authorities of problem activities Boundaries are known to the manager and local communities and are easily identified in the field. Boundaries are marked in areas where there is a high risk of encroachment.
Indicator 1.5.2	Verifiers & Guidance:

There are adequate personnel and surveillance resources to control such activities	Field observations provide no evidence of ongoing illegal activities
Criterion 1.6 Forest managers shall demonstrate a long-term commitment to adhere to the FSC Principles and Criteria	
Indicator 1.6.1 There is a publicly available policy endorsed by the owner/most senior management explicitly stating long term commitment to forest management practices consistent with the FSC Principles and Criteria <u>SLIMF:</u> The forest manager has plans to manage the forest in the long term in a way that is compatible with the FSC Principles and Criteria	Verifiers & Guidance: Written policy with appropriate statement is available <u>SLIMF:</u> The management plan Plans (written or informal) for investment, training, and sharing of income or other benefits Past management has been compatible with the P&C
Indicator 1.6.2 (Not applicable to SLIMF) The policy is communicated throughout the organisation (including to contractors) and to external stakeholders	Verifiers & Guidance: Interviews with Forest Managers, workers and stakeholders. Evidence of distribution of policy to stakeholders.
Indicator 1.6.3 Where the owner/manager has some responsibility for forest lands not covered by the certificate, then there is a clear long term commitment to managing all forests in the spirit of the FSC P&C	Verifiers & Guidance: <i>The applicant for certification must make a full disclosure of all forest areas over which the applicant has some responsibility, whether as owner (including share or partial ownership), manager, consultant or other responsibility. The disclosure shall be documented in the main assessment report. You must record full details of ownership, forest name, type, area and location for each such forest. This information must be made available to stakeholders as part of the consultation process.</i> <i>When the evaluation does not include all the forest areas in which the applicant is involved, the applicant must explain the reasons for this, and the reasons must be documented in the main assessment report.</i> Evidence of such other forest lands. Policies Interviews with Forest Managers.
Indicator 1.6.4 Management of forest areas identified under 1.6.4 complies with the latest FSC Partial Certification Policy	Verifiers & Guidance: Interviews with Forest Managers, policies, procedures and field observations.

PRINCIPLE 2. TENURE AND RIGHTS RESPONSIBILITIES:	
Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.	
Criterion 2.1	Clear, long-term tenure and forest use rights to the land (e.g. land title, customary rights or lease agreements) shall be demonstrated
Indicator 2.1.1	Verifiers & Guidance:
There is documentation showing the owner/manager's legal rights to manage the land and/or utilise forest resources	<p>Documentation with appropriate legal status.</p> <p>Maps clearly indicating the boundaries of the FMU.</p> <p><i>A valid concession license is available for state forest land.</i></p> <p><i>The licensee may not sub-contract the whole of the works. In addition, the licensee may not sub-contract without the consent of the Senior Forest Officer in writing</i></p>
Indicator 2.1.2	Verifiers & Guidance:
The FMU is committed to long-term forest management of at least one rotation length or harvest cycle.	<p>Policies and management plans make clear reference to management objectives that support this indicator.</p>
Indicator 2.1.3	Verifiers & Guidance:
Where the Forest Manager does not have legal title, the owner/government does not impose constraints that prevent compliance with the SGS Qualifor standard or the objectives of the management plan.	<p>Provisions in agreement for tenure.</p> <p>FMU management plans.</p> <p>FMU long term strategies.</p> <p><i>In Zambia there are two types of land tenure as follows:</i></p> <ul style="list-style-type: none"> ▪ <i>State land</i> ▪ <i>Customary land (managed by traditional leaders)</i> <p><i>All Forests are state owned. The Western Province constitutes a special reservation where the Lozi Tribal Common Law prevails. Here the forest land is divided into "Traditionally used land", where preference is given to custom, and Forest Estates, which are managed by the Forest Department.</i></p>
Criterion 2.2	Local communities with legal or customary tenure or use rights shall maintain control, to the extent necessary to protect their rights or resources, over forest operations unless they delegate control with free and informed consent to other agencies.
Indicator 2.2.1	Verifiers & Guidance:
All existing legal or customary tenure or use rights that local communities have within the FMU shall be documented and mapped	<p>Documentation showing acknowledgement by forest management of such agreements and maps.</p> <p>Interviews with Forest Managers and consultation with local community representatives.</p> <p><i>See above. "Traditionally used land" must be documented and mapped.</i></p>
Indicator 2.2.2	Verifiers & Guidance:
Forest planning and operations will be subject to these tenure or use rights unless such have	<p>Forest management plans</p> <p>Field observations</p>

been delegated to other agencies.	
Indicator 2.2.3	Verifiers & Guidance:
Where communities have delegated control of their legal or customary tenure or use rights, or part thereof, this can be confirmed by documented agreements and/or interviews with representatives of the local communities	Written agreements. Free and informed consent communicated by representatives of local communities. Clear evidence of payment for tenure or use rights.
Indicator 2.2.4	Verifiers & Guidance:
Allocation, by local communities, of duly recognized legal or customary tenure or use rights to other parties is documented, with evidence of free and informed consent	Interviews with local communities. Written agreements. Free and informed consent communicated by representatives of local communities.
Indicator 2.2.5	Verifiers & Guidance:
The forest is accessible to local rights holders to the extent that the forest's ecological function is not jeopardised.	Interviews with local communities. Inspection of areas/resources where access and/or use has taken place.
Criterion 2.3	Appropriate mechanisms shall be employed to resolve disputes over tenure claims and use rights. The circumstances and status of any outstanding disputes will be explicitly considered in the certification evaluation. Disputes of substantial magnitude involving a significant number of interests will normally disqualify an operation from being certified
Indicator 2.3.1	Verifiers & Guidance:
Appropriate documented procedures to resolve tenure claims and use right disputes are in place where any potential for such conflicts does exist <u>SLIMF:</u> There are no major unresolved disputes relating to tenure and use rights in the forest. Disputes or grievances are being resolved using locally accepted mechanisms and institutions. Measures are taken to avoid damage to other peoples' use rights or property, resources, or livelihoods. Where accidental damage occurs, fair compensation is provided.	Documented procedures. Interviews with Forest Managers and consultation with representatives of local communities. <i>Documented procedures are available that allow for a process that could generally be regarded as open and acceptable to all parties with an objective of achieving agreement and consent through fair consultation. Procedures should allow for impartial facilitation and resolution.</i> <u>SLIMF:</u> Interviews with Forest Manager and local community groups
Indicator 2.3.2	Verifiers & Guidance:
The Forest Manager shall maintain a record of disputes and the status of their resolution, including evidence related to the dispute and documentation of steps taken to resolve the dispute.	Documented records of disputes
Indicator 2.3.3	Verifiers & Guidance:
Unresolved tenure and/or use right disputes that	Magnitude of a dispute may be assessed by considering the

<p>are of a substantial magnitude and involving a significant number of interests should disqualify an operation from being certified.</p>	<p>scale at a landscape level associated with the opinion of a majority of community representatives and/or the time period over which the dispute has been in place</p> <p>Interviews with Forest Managers and consultation with representatives of local communities.</p> <p>Complete record of a history of disputes.</p>
<p>Indicator 2.3.4</p> <p>(Not applicable to SLIMF)</p> <p>Dispute resolution procedures shall make provision for the requirement that where the future tenure or use rights of communities may be compromised, forest operations that are, or may be the direct cause of the dispute, will not be initiated or will be suspended until the dispute had been resolved.</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers and consultation with representatives of local communities.</p> <p>Complete record of a history of disputes.</p>
<p>PRINCIPLE 3. INDIGENOUS PEOPLES' RIGHTS:</p> <p>The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognised and respected.</p>	
<p>Criterion 3.1 Indigenous peoples shall control forest management on their lands and territories unless they delegate control with free and informed consent to other agencies.</p>	
<p>Indicator 3.1.1</p> <p>Indigenous people who have customary or legal title to land and resources are identified and their entitlements recognised in management plans and the areas concerned demarcated on maps</p>	<p>Verifiers & Guidance:</p> <p>Management plans and maps.</p> <p>Consultation with representatives of indigenous peoples.</p> <p><i>ILO 169 (Indigenous and Tribal People's Convention, 1999)</i></p>
<p>Indicator 3.1.2</p> <p>Rights identified in terms of Indicator 3.1.1 are respected.</p>	<p>Verifiers & Guidance:</p> <p>Consultation with representatives of indigenous peoples.</p>
<p>Indicator 3.1.3</p> <p>There is documented evidence that free and informed consent has been given by affected communities to allow forest management activities that may affect their use rights of the FMU.</p>	<p>Verifiers & Guidance:</p> <p>Affected communities should have the financial, technical and logistical capacity to enable "free and informed consent"</p> <p>Consultation with representatives of indigenous peoples.</p> <p>No evidence of disputes.</p> <p>Evidence that agreed payments for use right and/or resources are being made.</p>
<p>Criterion 3.2 Forest management shall not threaten or diminish, either directly or indirectly, the resources or tenure rights of indigenous peoples</p>	
<p>Indicator 3.2.1</p> <p>Any impacts of forest management on indigenous communities' resources or tenure</p>	<p>Verifiers & Guidance:</p> <p>Records or impact assessments.</p> <p>Consultation with representatives of indigenous peoples</p>

rights are identified and recorded	
<u>SLIMF:</u> Any impacts of forest management on indigenous communities' resources or tenure rights are identified and known by the Forest Manager	
Indicator 3.2.2	Verifiers & Guidance: Records of meetings. Consultation with indigenous peoples
Indigenous peoples are explicitly informed of any impacts that forest management may have on their resources or tenure rights	
Indicator 3.2.3	Verifiers & Guidance: Consultation with representatives of indigenous peoples. Records of dispute resolution
Forest Management will not proceed without clear evidence of the free and informed consent of the indigenous peoples claiming such land, territory or customary rights, accepting impacts identified in terms of Indicator 3.2.1. Where disputes arise post facto, operations affecting these rights will be suspended until such dispute had been resolved	
Indicator 3.2.4	Verifiers & Guidance: Field inspections and records of corrective actions
Actions are taken to prevent or mitigate adverse impacts	
Criterion 3.3	Sites of special cultural, ecological, economic or religious significance to indigenous peoples [and other sections of the community] shall be clearly identified in co-operation with such peoples, and recognised and protected by forest managers.
Indicator 3.3.1	Verifiers & Guidance: Interviews with Forest Managers and consultation with stakeholders. Records and maps. Refer also to Indicator 7.1.1 <i>In a concession area, anything of historical or other interest or of significant value shall be the property of the Zambian Government. The Licensee needs to notify the Senior Forest Officer of any such discoveries.</i> <i>The Memorials Act and the National Heritage Conservation Commission Act (1989).</i>
Sites of special cultural, historical, ecological, economic or religious significance are identified, described and mapped in co-operation with affected or interested stakeholders. <u>SLIMF:</u> Sites of special cultural, historical, ecological, economic or religious significance have been identified and any special requirements are known.	
Indicator 3.3.2	Verifiers & Guidance: Management plans and documents. Consultation with stakeholders <u>SLIMF:</u> Interviews with the Forest Manager and field observations
Management objectives and prescriptions are developed (and documented) in co-operation with affected or interested stakeholders <u>SLIMF:</u> Clear management objectives have been identified.	

Indicator 3.3.3	Verifiers & Guidance:
Such areas are identified in working plans and demarcated in the field where this is considered appropriate	Operational plans and maps and field observation
Indicator 3.3.4	Verifiers & Guidance:
All operators and contractors can identify such sites in the field and measures are in place to prevent any form of damage or disturbance, other than such agreed with stakeholders.	Interviews with operators and field observations. Consultation with stakeholders
Indicator 3.3.5	Verifiers & Guidance:
Rights of access to these areas is permitted	Consultation with stakeholders
Criterion 3.4	Indigenous peoples shall be compensated for the application of their traditional knowledge regarding the use of forest species or management systems in forest operations. This compensation shall be formally agreed upon with their free and informed consent before forest operations commence.
Indicator 3.4.1	Verifiers & Guidance:
Indigenous peoples' traditional knowledge regarding the use of forest species or management systems in forest operations, which is being, or may be, utilised commercially by the forest organisation, is documented <u>SLIMF:</u> Indigenous peoples' traditional knowledge regarding the use of forest species or management systems in forest operations, which is being, or may be, utilised commercially by the forest organisation, have been identified	Documented records. Consultation with indigenous peoples. <u>SLIMF:</u> Interviews with Forest Manager and indigenous peoples/local communities
Indicator 3.4.2	Verifiers & Guidance:
Indigenous peoples shall be fully informed of the intent and nature of the use of their traditional knowledge by the assessed organisation. Such use will not proceed until indigenous peoples have agreed with free consent	Records of meetings with representatives of indigenous peoples. Consultation with representatives of indigenous peoples. Agreements.
Indicator 3.4.3	Verifiers & Guidance:
If such traditional knowledge is used for profit by the assessed organisation (or any other organisation under an agreement with the assessed organisation) compensation is formally agreed before such knowledge is used	Agreements. Consultation with representatives of indigenous peoples
Indicator 3.4.4	Verifiers & Guidance:
All agreed compensation is paid	Financial records

	<u>SLIMF:</u> Interviews with indigenous peoples/local communities
PRINCIPLE 4. COMMUNITY RELATIONS AND WORKER'S RIGHTS:	
Forest management operations shall maintain or enhance the long-term social and economic well being of forest workers and local communities.	
Criterion 4.1	The communities within, or adjacent to, the forest management area should be given opportunities for employment, training, and other services
Indicator 4.1.1	Verifiers & Guidance:
<p>People in local communities are given opportunities in employment, training and contracting</p> <p><u>SLIMF:</u></p> <p>Local workers and contractors should be used wherever possible</p>	<p>Interviews with Forest Managers and workers.</p> <p>Consultation with representatives of local communities and labour unions.</p> <p>Training strategies.</p> <p>Job advertisements in local publications</p> <p><i>The specific need for re-forestation projects in the Western Province has been documented with the benefit of employing local residents. This should be considered.</i></p>
Indicator 4.1.2	Verifiers & Guidance:
<p>In <u>large scale organisations</u>, contracts are awarded through a transparent process on the basis of clear criteria; justification for final selections is documented</p>	<p>Interviews with contractors.</p> <p>Policies and procedures of the assessed organisation.</p> <p>Documentation on contracting of services.</p>
Indicator 4.1.3	Verifiers & Guidance:
<p>In <u>large scale organisations</u> training and/or other appropriate forms of assistance to local people and workers to meet the organisation's long-term staffing requirements are developed and supported</p>	<p>Workers include: employees, contractors, sub-contractors, and any other persons carrying out forestry work on the forest management unit.</p> <p>Long-term training plans.</p> <p>Interviews with Forest Managers and workers.</p>
Indicator 4.1.4	Verifiers & Guidance:
<p>(Not applicable to SLIMF)</p> <p>Support is provided for local infrastructure and facilities at a level appropriate to the scale of the forest resources</p>	<p>Service provision and support for local infrastructure, facilities should, as a minimum, be consistent with meeting management plan objectives over the long term (e.g. provision of basic health, education and training facilities where these do not exist) as well as avoiding or mitigating any negative social impacts of the operations.</p> <p>Consultation with representatives of local communities</p> <p>Provision of training; schooling; medical; facilities; housing; accommodation</p> <p><i>An incentive scheme has specifically been recommended for the Western Province where, in return for assisting with fire prevention, local communities could be given access to Fuelwood or be given assistance for the digging of wells to provide water on an all year basis. Alternative assistance recommended is the modernisation of farm equipment.</i></p>

Indicator 4.1.5	Verifiers & Guidance:
Where practicable, communities are given controlled access to forest and non-forest products on the FMU	Interviews with Forest Managers and local communities. Evidence of controlled harvesting activities
Indicator 4.1.6	Verifiers & Guidance:
Policies and procedures and the implementation thereof make qualifications, skills and experience the basis for recruitment, placement, training and advancement of staff at all levels <u>SLIMF:</u> Employees are not discriminated in hiring, advancement, dismissal remuneration and employment related to social security	No evidence of discrimination on the basis of: race, colour, culture, sex, age, religion, political opinion, national extraction or social origin Employment policies and procedures. Interviews with Forest Managers, workers and Labour Union representatives. <u>SLIMF:</u> Interviews with workers and contractors <i>In the case of a concession, the licensee must employ among the key personnel a qualified forester to supervise the entire site works related to felling. The Senior Forest Officer must approve any proposed replacement of such key personnel.</i>
Indicator 4.1.7	Verifiers & Guidance:
All employees, contractors and sub-contractors must be paid a fair wage and other benefits, which meet or exceed all legal requirements and those provided in comparable occupations in the same region	Benefits may include social security payments, pension, accommodation, food, etc. Records of payment Interviews with Forest Managers, workers and Labour Union representatives. <i>According to http://en.wikipedia.org/wiki/ (name of country) minimum wage for Zambia is as follows: 268,000 <u>Zambian kwacha</u> per month in the formal sector; for nonunionized workers, whose wages and conditions of employment are not regulated through collective bargaining, is determined by category of employment (2010).</i> <i>The Minimum Wages and Conditions of Employment Act (No. 2 of 2002).</i>
Indicator 4.1.8	Verifiers & Guidance:
No workers should be engaged in debt bondage or other forms of forced labour	Interviews with Forest Managers, workers and Labour Union representatives
Indicator 4.1.9	Verifiers & Guidance:
Persons under 15 years are not employed in any forestry work	National legislation may set higher minimum ages, but these ages are defined in ILO Convention 138 Article 3. Interviews with Forest Managers, workers and Labour Union representatives Observations in the work place.
Indicator 4.1.10	Verifiers & Guidance:
Persons under 18 years should not be employed at night or to carry out heavy work or hazardous operations, e.g. pesticide application,	Where children and young persons are to be removed from employment in order to comply with this requirement, criterion 4.4 on social impact assessment and mitigation will apply.

<p>harvesting, except for the purposes of training</p>	<p>Organisations are expected to carry out a social impact assessment of the displacement of children from the workplace and effectively mitigate that impact e.g. provide suitable alternative sources of family income and ensure the children have access to adequate education facilities.</p> <p><i>The Minimum Wages and Conditions of Employment Act (No. 2 of 2002).</i></p>
<p>Criterion 4.2 Forest management <u>should</u> meet or exceed all applicable laws and/or regulations covering health and safety of employees and their families</p>	
<p>Indicator 4.2.1</p> <p>Forest Managers are aware of laws and/or regulations covering health and safety of employees and their families and comply with such.</p> <p>For large scale organisations a written safety and health policy and management system are in place</p>	<p>Verifiers & Guidance:</p> <p>Forestry operations should follow the ILO Code of Practice on Safety and Health in Forestry.</p> <p>Interviews with Forest Managers, workers and union representatives.</p> <p>Guidelines/regulations are readily available.</p> <p>Labour directives and inspection reports.</p> <p>Company OHS records</p>
<p>Indicator 4.2.2</p> <p>Forest Managers have systematically assessed the risk associated with all tasks and equipment and prescribed appropriate safe procedures, the use of personal protective equipment (PPE), emergency procedures and where appropriate, key responsibilities.</p> <p>In large scale organisations, compliance with this requirement shall be supported by documentation</p> <p><u>SLIMF:</u></p> <p><u>All work done in the forest must comply with health and safety laws and regulations</u></p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers, workers and union representatives.</p> <p>Documented risk assessments.</p> <p><u>SLIMF:</u></p> <p>Equipment is available to workers</p> <p>Interviews with Forest Managers and workers</p> <p>Field observations</p> <p><i>Specifically see the ILO Technical guidelines for Safety and health at the Forestry Worksite, 12 General provisions, and clauses 243-276.</i></p> <p><i>Risk assessment should include risks of exposure of workers to excessive UV radiation (ILO CoP on S&H in Forestry Work, 1998)</i></p>
<p>Indicator 4.2.3</p> <p>All workers have had relevant training in safe working practice and where required or appropriate, hold the necessary skills certificates.</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers and workers.</p> <p>Training schedules and records</p> <p>Copies of skills certificates.</p> <p><i>Chainsaw operators must have the necessary skills certificate.</i></p> <p><i>All workers should be trained in basic First Aid, and such training should be repeated at regular intervals. The First Aider in charge should have the necessary skills certificate.</i></p> <p><i>The person in charge of the kitchen in a camp should be skilled in nutrition, sanitation and food-handling, and should be licensed by a competent authority and inspected regularly.</i></p>
<p>Indicator 4.2.4</p> <p>Forestry operations comply as a minimum, with</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers and workers</p>

the ILO Code of Practice on Safety and Health in Forestry		Zambia is a signatory to ILO. The FMU should have a copy of the ILO Code of Practice on Safety and Health in Forestry Work (ILO1998) or proof of access to it.
Indicator 4.2.5	All necessary tools, machines, substances and equipment, including appropriate PPE, are available at the worksite and are in safe and serviceable condition	Verifiers & Guidance:
		Interviews with Forest Managers and workers. Field observations. <i>Chainsaw operators are required to wear the following: safety boots and trousers, gloves, safety helmet, a mesh visor, ear muff and close fitting clothing.</i> <i>Workers need to be protected from excessive UV radiation, and discomfort caused by biting and stinging insects.</i> <i>First Aid kits must be available on site, clearly marked and all operatives should be informed of the location of the kit and the procedure for obtaining stocks.</i> <i>An adequate supply of safe drinking water must be available at the worksite. For Physical work in hot climates, 1litre per person per hour may be required.</i>
Indicator 4.2.6	Managers take all reasonable measures to ensure that workers use the PPE that is provided	Verifiers & Guidance:
		Interviews with Forest Managers and workers. Field observations
Indicator 4.2.7	Health and safety records (including risk evaluations, accident records) are maintained and up-to-date <u>SLIMF:</u> Basic record is kept of health and safety related incidents	Verifiers & Guidance:
		Records of accidents, incidents, instructions to supervisors and workers <u>SLIMF:</u> Records Interviews with Forest Manager and workers <i>Check that H&S records are maintained at the worksite (e.g. by First Aiders at the cutting site)</i>
Indicator 4.2.8	All employees and contractors and their families have access to adequate local medical facilities while working on the FMU.	Verifiers & Guidance:
		Interviews with Forest Managers and workers <i>Where professional help is not available within a reasonable distance, a dispensing and health care facility should be created. At permanent worksites, a place should be provided where an ill or injured person can rest in comfort until the evacuation is under way.</i>
Indicator 4.2.9	Where located and provided on the FMU worker accommodation and nutrition comply, as a minimum, with the ILO Code of Practice on Safety and Health in Forestry.	Verifiers & Guidance:
		Interviews with Managers and workers Inspection of facilities
Indicator 4.2.10		Verifiers & Guidance:

<p>There is evidence of a programme on the FMU that raises awareness of illnesses and diseases endemic to the area that affect forest workers or their families.</p> <p>For <u>large scale organisations</u> there is contribution towards or provision of a prevention and control programme for any illnesses and diseases endemic to the area that affect forest workers or their families</p> <p><u>SLIMF:</u></p> <p>There is evidence of a basic programme on the FMU that raises awareness of illnesses and diseases endemic to the area that affect workers or their families</p>	<p>Interviews with Forest Managers and workers.</p> <p>Interviews with social NGOs.</p> <p>Records of support.</p> <p>Health statistics for the region.</p> <p><u>SLIMF:</u></p> <p>Interviews with forest manager and workers</p> <p><i>As with the rest of Southern Africa, the major causes of human death in Zambia are AIDS, malaria and tuberculosis. AIDS overtook other diseases as the top killer in late 1996, and is greatly under-reported. The other main causes of deaths in Zambia are as follows: gastroenteritis, cancers, pneumonia, premature birth, cardiovascular illnesses and malnutrition.</i></p> <p><i>There should be evidence of implementation of an HIV/AIDS strategy on the forest management units.</i></p>
<p>Criterion 4.3 The rights of the workers to organise and voluntarily negotiate with their employers shall be guaranteed as outlined in Conventions 87 and 98 of the International Labour Organisation (ILO).</p>	
<p>Indicator 4.3.1</p>	<p>Verifiers & Guidance:</p>
<p>Workers are free to organise and or join a trade union of their choice without fear of intimidation or reprisal. This will at a minimum comply with the requirements of the ILO Convention No. 87: Convention concerning Freedom of Association and Protection of the Right to Organise</p>	<p>Interviews with Forest Managers, workers and labour union representatives.</p> <p><i>Industrial and Labour Relations Act (No 30 of 1997). Proof of access to ILO Convention No. 87.</i></p> <p><i>Check that labour unions are included on the stakeholder's list (4.4.3).</i></p>
<p>Indicator 4.3.2</p>	<p>Verifiers & Guidance:</p>
<p>Workers are free to organise and bargain collectively. This will at a minimum comply with the requirements of International Labour Organisation convention 98, Convention concerning the Application of the Principles of the Right to Organise and to Bargain Collectively</p>	<p>Interviews with Forest Managers, workers and labour union representatives</p> <p><i>Industrial and Labour Relations Act (No 30 of 1997). Proof of access to ILO Convention No. 98.</i></p>
<p>Indicator 4.3.3</p>	<p>Verifiers & Guidance:</p>
<p>There is an effective mechanism in place to provide information to, and enable the participation of workers in decision-making where this directly affects their working terms and conditions</p> <p><u>SLIMF:</u></p> <p>Workers or their representatives are accepted as participants in decision making</p>	<p>Interviews with Forest Managers, workers and labour union representatives</p>
<p>Criterion 4.4 Management planning and operations shall incorporate the results of evaluations of social impact. Consultations shall be maintained with people and groups directly affected by management operations.</p>	
<p>Indicator 4.4.1</p>	<p>Verifiers & Guidance:</p>
<p>In conjunction with the local stakeholders</p>	<p><i>New operations will normally be subjected to formal impact</i></p>

<p>affected and in accordance with the scale and intensity of management, the social, socio-economic, spiritual and cultural impacts of forest operations are evaluated.</p> <p>For <u>large scale organisations</u>, these impacts shall be documented</p> <p><u>SLIMF (Small Forests):</u></p> <p>Anyone who is likely to be directly affected by an operation is informed and has an opportunity to comment.</p> <p>The forest manager must try to avoid negative impacts of operations.</p> <p><u>SLIMF (Low Intensity Forests):</u></p> <p>The forest manager proactively seeks assistance from external organizations to carry out an assessment of social impacts and/or social impact monitoring and uses the results to plan future management.</p>	<p>assessments and these assessments must include the social environment. For ongoing operations it will be necessary to maintain communication with stakeholders and thus ensure the Forest Manager is aware of any current and/or potential impacts. Management plans must provide mitigatory measures to address such impacts, e.g. problems with dust or noise caused by operations are known and planning is adjusted to reduce or negate such</p> <p>Interviews with Forest Managers and local communities.</p> <p><u>SLIMF (Small Forests):</u></p> <p>Discussions with neighbours and forest manager</p> <p>Copies of newspaper advertisements, letters, posters and signs used to inform people of operations.</p> <p><u>SLIMF (Low Intensity Forests):</u></p> <p>Copies of Social Impact Assessment reports</p> <p>Evidence of changes in management following results of an Social Impact Assessment or monitoring of social impacts.</p> <p><i>Consult the Environmental Impact Assessment in the case of concessions.</i></p> <p><i>Consult "The Forest Resources Management Study for Zambia Teak Forests in South-Western Zambia" (See Appendix A). Studies have already indicated that active re-forestation is necessary in South Western Zambia, and that nurseries will be necessary in order to propagate the desired seedlings (e.g. Mukwa). These projects promoted the employment opportunities for local residents, as well as educational opportunities.</i></p>
<p>Indicator 4.4.2</p> <p>(Not applicable to SLIMF)</p> <p>Adverse impacts, opportunities for positive impact and areas of potential conflict identified by evaluations are adequately addressed in plans</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers and local communities.</p> <p>Management plans</p> <p><i>The adverse impacts of overgrazing and burning in the forest areas must be identified and addressed. Overgrazing and burning have been documented as direct threats to forests and soil fertility in the Western Province of Zambia, where cutting concessions are issued (consult "The Forest Resources Management Study for Zambia Teak Forests in South-Western Zambia").</i></p>
<p>Indicator 4.4.3</p> <p>An up-to-date list of stakeholders is maintained</p>	<p>Verifiers & Guidance:</p> <p>Records</p> <p>Consultation with stakeholders</p> <p><i>Stakeholders must incorporate the Tribal Chiefs and Senior Chiefs, especially in the Western Province.</i></p>
<p>Indicator 4.4.4</p> <p>(Not applicable to SLIMF)</p> <p>There is adequate and ongoing consultation with stakeholders (local people, workers and relevant organisations); in particular, stakeholders are aware that forest management plans and monitoring results are available for inspection, if high impact operations are</p>	<p>Verifiers & Guidance:</p> <p>Records</p> <p>Consultation with stakeholders and interviews with Forest Managers</p>

planned, and that the FMU is being evaluated/monitored for certification	
Indicator 4.4.5	Verifiers & Guidance:
Issues raised by stakeholders are treated constructively and objectively	Records Consultation with stakeholders and interviews with Forest Managers
Indicator 4.4.6	Verifiers & Guidance:
In <u>large scale operations</u> , communications with stakeholders on issues that require action and follow-up should be documented	Documentation of communication
Criterion 4.5	Appropriate mechanisms shall be employed for resolving grievances and for providing fair compensation in the case of loss or damage affecting the legal or customary rights, property, resources or livelihoods of local peoples. Measures shall be taken to avoid such loss or damage
Indicator 4.5.1	Verifiers & Guidance:
Every effort is made to resolve disputes through fair consultation aimed at achieving agreement and consent	Records Consultation with stakeholders and interviews with Forest Managers
Indicator 4.5.2	Verifiers & Guidance:
(Not applicable to SLIMF) Dispute resolution is clearly defined. System for resolving disputes includes legal requirements and is documented for <u>large scale operations</u> .	Records Consultation with stakeholders and interviews with Forest Managers <i>Industrial and Labour Relations Act (No 30 of 1997)</i> <i>Worker's Compensation Act, (No 10 of 1999).</i>
PRINCIPLE 5. BENEFITS FROM THE FOREST:	
Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.	
Criterion 5.1	Forest management should strive towards economic viability, while taking into account the full environmental, social, and operational costs of production, and ensuring the investments necessary to maintain the ecological productivity of the forest
Indicator 5.1.1	Verifiers & Guidance:
Optimal use is made of the potential annual yield of forest products	Annual plan of operations, budgets and financial statements. Yield estimates
Indicator 5.1.2	Verifiers & Guidance:
Current and future budgets include specific provision for environmental and social, as well as all operational costs <u>SLIMF</u>	<i>Income may be interpreted broadly as direct income from sales of forest products and indirect income from leisure/tourism, charitable fundraising, payments for environmental services rendered and subsidies.</i> Financial planning records and statements.

The Forest Manager is aiming to be in an economically viable situation which permits long term forest management		Interviews with Forest Managers
Indicator 5.1.3	Verifiers & Guidance:	
Where necessary, investments are made to maintain the ecological productivity of the forest	Interviews with Forest Managers and environmental NGOs. Plans and maps. Observation of ecosystems. <i>The Japanese study of the South Western Teak Forests of Zambia recommended that, due to past exploitation and shifting agriculture land use, it was necessary to invest in securing good quality seeds for re-forestation by direct sowing. It was recommended that seed storehouses be established (with air conditioning) for them.</i> <i>The establishment of nurseries to propagate species for forest restoration was also recommended. See 6.3.3 also. It is the obligation of the certified FMU to restore degraded forests.</i> <i>In Zambia, surveys and studies on reforestation are necessary.</i>	
Criterion 5.2 Forest management and marketing operations should encourage the optimal use and local processing of the forest’s diversity of products.		
Indicator 5.2.1	Verifiers & Guidance:	
(Not applicable to SLIMF) The owner/manager should promote the development of markets for and sustainable harvesting of common, lesser known plantation-grown or natural forest species and non-timber forest products	Interviews with Forest Managers and consultation with local communities.	
Indicator 5.2.2	Verifiers & Guidance:	
Local processing and markets are provided access to forest products available from the FMU, unless there is a justifiable reason for not doing so <u>SLIMF</u> Local processing is used where it is viable.	Interviews with Forest Managers and consultation with local communities. Evidence of opportunities to support local processing and markets. <u>SLIMF:</u> Details of sales of timber and information about local processing options. <i>Zambia is a land locked country, far from any seaport, so overland transport of product will always be an issue. In this regard, it would be more advantageous to transport higher added value lumber products.</i>	
Criterion 5.3 Forest management <u>should</u> minimise waste associated with harvesting and on-site processing operations and avoid damage to other forest resources.		
Indicator 5.3.1	Verifiers & Guidance:	
Strategic and tactical/operational harvest planning and harvest operations should be carried out in accordance with national best practice guidelines (where these do not exist or	Harvest plans Forest Managers’ knowledge of local BOPs <u>SLIMF:</u>	

<p>are inadequate, for tropical high forest the FAO Model Code of Forest Harvesting Practice will apply)</p> <p>SLIMF:</p> <p>Wood waste and damage to the remaining forest during harvesting and on site processing are minimised.</p> <p>5.3.2.1: Immediately after the felling of trees cut under a licence, all of the branch wood not utilised must be cut up.</p> <p>5.3.2.2: Within a month of felling trees, all of the cut branch wood and waste must be cleared up to a distance of at least 2m from growing trees and fresh stumps.</p> <p>5.3.2.3: All damaged trees must be felled, unless the top and main stem is intact, and the tree will recover.</p>	<p>Field inspections</p> <p>Harvest records and sales volumes</p>
<p>Indicator 5.3.2</p> <p>Harvesting techniques are designed to avoid log breakage, timber degrade and damage to the forest stand</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers, supervisors and workers.</p> <p>Observation of harvesting operations</p>
<p>Indicator 5.3.3</p> <p>Waste generated through harvesting operations, is minimised whilst leaving adequate organic material on the forest floor for soil conservation</p> <p>5.3.3.1: All trees cut under a license shall be cut within 30cm from the ground. Exceptions for buttresses and root swellings are granted.</p>	<p>Verifiers & Guidance:</p> <p><i>When timber products are removed from the stand sufficient material in the form of tops, branches and solid wood should remain behind to assist the natural nutrient cycle.</i></p> <p>Observation of harvesting and on-site processing operations.</p>
<p>Indicator 5.3.4</p> <p>Harvested and processed wood and/or products processed on-site are transported from the forest before any deterioration occurs</p>	<p>Verifiers & Guidance:</p> <p>Observation of harvesting operations.</p> <p>Records of timber deliveries</p>
<p>Criterion 5.4 Forest management <u>should</u> strive to strengthen and diversify the local economy, avoiding dependence on a single forest product.</p>	
<p>Indicator 5.4.1</p> <p>The forest should be managed for more than one product, considering both timber and non-timber forest products. Local initiatives involving the use of processing and/or marketing of forest products are encouraged.</p> <p>SLIMF (Small Forests):</p> <p>Not applicable</p> <p>SLIMF (Low Intensity Forests):</p> <p>Forest management should aim to avoid dependence on a single forest product. Local</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers.</p> <p>Forest management planning</p> <p><u>SLIMF (Low Intensity Forests):</u></p> <p>Sales records.</p> <p>Discussions with local communities and the forest manager</p>

initiatives involving the use, processing and or marketing of forest products are encouraged.	
Indicator 5.4.2	Verifiers & Guidance:
The utilisation of non-timber forest products by local community enterprises is encouraged	Interviews with Forest Managers and consultation with local communities. Evidence of NTFP sales or licenses or permits issued.
Criterion 5.5 Forest management operations shall recognise, maintain and, where appropriate, enhance the value of forest services and resources such as watersheds and fisheries.	
Indicator 5.5.1	Verifiers & Guidance:
Forest managers are aware of the range of forest services and resources	Interviews with Forest Managers
Indicator 5.5.2	Verifiers & Guidance:
Forest management practices minimise negative impacts on services and other forest resources	Interviews with Forest Managers
Indicator 5.5.3	Verifiers & Guidance:
<p>Forest management practices maintain and where appropriate, enhance the value of forest services and resources:</p> <ul style="list-style-type: none"> Monitoring evidence that services and resources are maintained Practices to enhance services and resources are evident. 	Interviews with Forest Managers
Criterion 5.6 The rate of harvest of forest products shall not exceed levels, which can be permanently sustained.	
Indicator 5.6.1	Verifiers & Guidance:
<p>Data on forest growth, regeneration and volumes harvested and thinned are reported regularly and analysed in comparison with predicted volumes and growth data (data accuracy is appropriate to scale and intensity of management)</p> <p><u>SLIMF (Small Forests):</u></p> <p>Harvest levels are sustainable over the long term (a period equivalent to the rotation length of the trees harvested). Note that annual harvest levels may vary hugely.</p> <p><u>SLIMF (Low Intensity Forests):</u></p> <p>Harvest limits are established at sustainable levels, based on conservative estimates of tree growth and yield rates. The harvest limits are stated in the management plan.</p>	<p>Evidence of enumerations, yield calculations and harvesting planning</p> <p><u>SLIMF:</u></p> <p>Management plan</p> <p>Field observations of harvesting sites compared to areas planned for harvesting.</p> <p>Maps of tree location</p> <p>Harvest and sales records and plans over the relevant time span.</p> <p>Data on likely or actual growth rates of species harvested.</p>

<p>Indicator 5.6.2</p> <p>Sustainable harvest and thinning intensities and frequencies have been calculated for the FMU based on the most up-to-date available information and do not exceed calculated replenishment rates over the long term.</p> <p>South Western Zambian natural Teak Forests):</p> <p>5.6.2.1: No trees with a DBH of < 40 cm are allowed to be cut.</p> <p>5.6.2.2: In the case of Mukusi, at least 30 trees of DBH ≥ 30cm remain per hectare as seed trees. If 30 seed trees cannot be left standing then cutting of this species is prohibited.</p> <p>5.6.2.3: In the case of Mukwa, at least 5 trees of DBH ≥ 30cm remain per hectare as seed trees. If 5 seed trees cannot be left standing then cutting of this species is prohibited.</p> <p>5.6.2.3: In the case of a pit-sawing license, a maximum of 100 m³ of timber may be felled in one calendar month. In the case of a Concession Licence, a maximum of 400 m³ may be felled in one calendar month.</p>	<p>Verifiers & Guidance:</p> <p>Timber resource planning</p> <p><i>In terms of the South Western Zambian natural Teak Forests, the Japanese Report (See Appendix A) must be considered and the following applies:</i></p> <ol style="list-style-type: none"> <i>1. Based on an 80-100 year rotation of commercial forest species, selective cutting in 20 year cycles is recommended.</i> <i>2. The Annual Allowable Cut (AAC) is based on the formulas listed for Mukusi and other species. The Concession license will also specify an AAC, but these two values need to be synchronised, and the more conservative AAC applied.</i> <i>3. Under the present rules, trees of a DBH of 30 cm may be cut, but the Japanese report argues that this standard should be raised to 40cm from the viewpoint of improvement of yield as well as sustainability. The more conservative figure is adopted for this standard.</i> <p><i>DBH (diameter at breast height) is measured 130cm above ground.</i></p> <p><i>See Appendix C for Botanical names of trees mentioned.</i></p>
<p>Indicator 5.6.3</p> <p>Authorised harvesting of non-timber forest products does not exceed calculated replenishment rates over the long term</p> <p>5.6.3.1: All head loads of thatching grass cut under a licence must be stacked in stacks of 10 head load bundles (off-take is then recorded).</p>	<p>Verifiers & Guidance:</p> <p>Management plans</p>
<p>PRINCIPLE 6. ENVIRONMENTAL IMPACT:</p> <p>Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.</p>	
<p>Criterion 6.1 Assessment of environmental impacts shall be completed - appropriate to the scale, intensity of forest management operations and the uniqueness of the affected resources - and adequately integrated into management systems. Assessments shall include landscape level considerations as well as the impacts of on-site processing facilities. Environmental impacts shall be assessed prior to commencement of site disturbing operations.</p>	
<p>Indicator 6.1.1</p> <p>(Not applicable to SLIMF)</p> <p>The owner/manager has systematically identified and assessed the potential environmental impacts of all activities (including on-site processing facilities) carried out in the forest; the impacts of forest plans have been considered at the landscape level, taking account of the interaction with adjoining land</p>	<p>Verifiers & Guidance:</p> <p><i>For all operations or activities carried out on the FMU, there should be an evaluation of the possibility of the following potentially negative impacts being caused: soil erosion and compaction; changes to soil productivity; changes to invasive exotic, native or naturalised flora or fauna species abundance, diversity or distribution. Habitat fragmentation, pesticide, lubricant, nutrient or fertiliser pollution (by runoff, spray drift or spillage) and sedimentation of watercourses or water bodies; changes to water flow and drainage regimes of watercourses,</i></p>

<p>and other nearby habitats. For <u>large scale organisations</u>, the results of these impact assessments shall be documented.</p>	<p>water bodies, visual changes to prominent landscapes. Working Instruction 01 regarding on-site processing plants must be used as reference.</p> <p>Interviews with Forest Managers, environmental NGOs and government conservation agencies.</p> <p><i>The issuance of a concession license is subject to the production of a valid Environmental impact Assessment by the Licensee.</i></p>
<p>Indicator 6.1.2</p>	<p>Verifiers & Guidance:</p>
<p>Site-specific assessments of the potential environmental impacts of all forest operations are carried out prior to commencement of site disturbing operations, in a manner appropriate to the scale of the operations and the sensitivity of the site. Where such activities are considered “significant”, these site-specific assessments are documented. “Significant” activities shall include, but not be restricted to:</p> <ul style="list-style-type: none"> ▪ The building of new roads or substantial rerouting of existing roads; ▪ Any form of flow restriction in streams and rivers; ▪ Aforestation; ▪ Change in genus in the reforestation of more than 100 ha during the same planting season within an operational/management unit, where an FMU comprises more than one; ▪ Recreational activities and associated infrastructure ▪ Communication masts and associated infrastructure ▪ Power lines ▪ Water lines ▪ Change of natural vegetation to commercial or any other use. ▪ Erection of new fences ▪ Use of natural areas and products for commercial gain or any other purpose ▪ New waste disposal sites; ▪ Implementation of new/modified activities/products that may have significant impacts on the environment. 	<p>A “significant activity is an activity that has the potential to cause environmental impacts that are:</p> <ul style="list-style-type: none"> ▪ Permanent or long term; or ▪ Affects a wide environment <p>An EIA is the formal procedure that is followed to collect, organise, analyse, interpret and communicate data that are relevant to making a decision. The procedure can however be followed as an informal assessment for a project such as the planning of a harvesting operation. The purpose of an EIA is to minimise negative impacts, ensure the conservation of important features and to enhance positive aspects of the project.</p> <p>Principles that a formal EIA should comply with are:</p> <p>Informed Decision Making: Decision-making should be based on reliable information.</p> <p>Accountability: Responsibilities must be clearly defined.</p> <p>Environment in the Broadest Sense: The environment includes all aspects (i.e. physical, social, political, economic, visual).</p> <p>Open Consultation: Consultation with all interested and affected parties must be done in a transparent manner.</p> <p>Specialist Input: Specialists in the particular field must support impact assessments.</p> <p>Alternatives: Consider all possible alternatives in terms of location and activities.</p> <p>Mitigatory Measures: Assess mitigatory measures that will reduce or negate negative impacts and enhance the positive impacts of the planned activities.</p> <p>Consider all Stages: The assessment should consider all stages of the development, from the planning phase through to closure.</p> <p>Interviews with Forest Managers also testing their basic knowledge of EIAs.</p> <p>Records of assessments and decisions.</p> <p>Environmental management plans.</p>
<p><u>SLIMF (Small Forests):</u></p> <p>Before starting any operation, the possible negative environmental impacts are identified and the operation is designed to minimise them. Assessments do not need to be documented unless legally required</p>	<p><u>SLIMF:</u></p> <p>Manager’s knowledge of the site and impacts of operations</p> <p>Field observations</p> <p>Management plan</p> <p>Documented environmental statement or assessment where legally required</p>
<p><u>SLIMF (Low Intensity Forests):</u></p> <p>Before starting any operation, the possible negative environmental impacts at the site and landscape levels are identified and the operation is designed to minimise them. Assessments do not need to be documented unless legally</p>	<p><i>The Environmental Impact Assessment Regulations, SI No. 28 of 1997 identify some projects that require project briefs such as</i></p>

<p>required</p>	<p><i>urban development, transportation, dams, mining, land clearing for large scale agriculture, electrical infrastructure (electricity generation), waste disposal sites, nature conservation areas (forests, national parks, GMAs} and introduction of alien species to the local ecosystem.</i></p> <p><i>The issuance of a cutting licence is subject to the production of a valid Environmental Impact Assessment by the Licensee.</i></p> <p><i>In a concession area, the licensee may establish infrastructure (roads, workshops, offices, dwelling houses, camps, ramps etc), sink boreholes, make dams, erect telephone lines, and stone and gravel for construction or roads, but all of these activities are still subject to site specific impact assessments (FSC requirement), even though the need for this is not spelled out in the conditions of the concession license.</i></p>
<p>Indicator 6.1.3</p> <p>All potential environmental impacts identified during assessments are considered during operations and planning and ensure that adverse impacts are avoided or mitigated</p>	<p>Verifiers & Guidance:</p> <p>See also requirements 6.5.1 and 6.5.2.</p> <p>Interviews with Forest Managers, supervisors and workers also testing their knowledge of minimum requirements.</p> <p>Field observations and operational plans. For <u>large scale operations</u>, these provisions and controls will be documented in plans.</p>
<p>Indicator 6.1.4</p> <p>Timely corrective actions are considered and implemented to address both past and potential non-conformances.</p>	<p>Verifiers & Guidance:</p> <p><u>Corrective Actions:</u></p> <p><i>The first <u>objective</u> is, whenever there is a non-conformance:</i></p> <ul style="list-style-type: none"> ▪ <i>action is taken to correct any damage to the environment that may have occurred (corrective action); and</i> ▪ <i>measures are instituted to prevent the non-conformance from recurring (preventive action).</i> <p><i>The <u>second objective</u> is to ensure that preventative action is taken where there is obvious potential for an activity to develop into a non-conformance with subsequent environmental impact(s).</i></p> <p><i>The <u>third objective</u> is to ensure that CARs are reviewed periodically to identify persistent problem areas and to ensure that such problem areas are appropriately addressed, in either a corrective or a preventative manner.</i></p> <p>Interviews with managers.</p> <p>Comparison of quality of ongoing operations and associated record of past CARs.</p>
<p>Indicator 6.1.5</p> <p>Corrective action requests (CARs) are recorded and closed out appropriately</p> <p><u>SLIMF:</u></p> <p>Timeous corrective actions are taken</p>	<p>Verifiers & Guidance:</p> <p><u>Records of CARs</u></p> <p><u>SLIMF:</u></p> <p>Interviews with the forest Manager and workers and field observations</p>
<p>Indicator 6.1.6</p> <p>Non-native plant (non-tree) and animal species are introduced and/or native species re-</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers, environmental NGOs and government agencies.</p>

<p>introduced only if consultation with acknowledged experts and regulatory authorities establishes that they are non-invasive and will bring environmental benefits; local stakeholders are consulted prior to any introduction; all introductions are closely monitored</p>	<p>Research briefs. Licences and permits.</p>
<p>Criterion 6.2 Safeguards shall exist which protect rare, threatened and endangered species and their habitats (e.g. nesting and feeding areas). Conservation zones and protection areas shall be established, appropriate to the scale and intensity of forest management and the uniqueness of the affected resources. Inappropriate hunting, fishing, trapping and collecting shall be controlled.</p>	
<p>Indicator 6.2.1</p> <p>Rare, threatened and endangered species and their habitats present (or likely to be present) on the FMU have been identified and documented</p> <p><u>SLIMF (Small Forests):</u></p> <p>Where known, rare, threatened and endangered species and their habitats are protected.</p> <p><u>SLIMF (Low Intensity Forests):</u></p> <p>Where known, rare, threatened and endangered species and their habitats are mapped and protected.</p>	<p>Verifiers & Guidance:</p> <p><i>Where survey data are incomplete, it should be assumed that relevant species ARE present.</i></p> <p>Interviews with Forest Managers, local experts and government agencies.</p> <p>Refer also to 7.1.7</p> <p><u>SLIMF (Small Forests):</u></p> <p>Manager's knowledge of rare, threatened and endangered species in the area.</p> <p>Records from other sources of species found on the site.</p> <p>Field observations of nesting and feeding areas of rare, threatened and endangered species.</p> <p><u>SLIMF (Low Intensity Forests):</u></p> <p>Manager's and workers' knowledge of rare, threatened and endangered species in the area.</p> <p>Reports of training for forest workers on protection issues.</p> <p>Field observations of nesting and feeding areas of rare, threatened and endangered species.</p> <p>Reports of the conservation status of the FMU from other sources.</p> <p><i>See Appendix B for information on RT&E species of Zambia and information about vegetation types in terms of indigenous tree harvesting.</i></p>
<p>Indicator 6.2.2</p> <p>Where appropriate, there is co-operation with acknowledged experts, conservation organisations and regulatory authorities in identifying conservation zones and protection areas for rare, threatened and endangered species present; these habitats are demarcated on maps, and, where necessary, on the ground</p> <p><u>SLIMF:</u></p> <p>Other features which are important for conservation are identified and protected.</p>	<p>Verifiers & Guidance:</p> <p>Records and maps.</p> <p>Interviews with Forest Managers, local experts and government agencies.</p> <p><u>SLIMF:</u></p> <p>Maps showing conservation features</p> <p>Field observations and interviews with forest manager</p>
<p>Indicator 6.2.3</p> <p>Rare, threatened and endangered species are</p>	<p>Verifiers & Guidance:</p> <p>Operational plans.</p>

protected during operations	Interviews with Forest Managers, local experts and government agencies.
<p>Indicator 6.2.4</p> <p>(Not applicable to SLIMF)</p> <p>Conservation zones and protection areas, representative of existing ecosystems, are being protected in their natural state, based on the identification of key biological areas and the requirement for natural corridors (with special reference to plantations) and/or consultation with local experts and government agencies</p> <p>Landscape scale conservation considerations are evident in field activities, staff/contractor actions and/or in coordination with adjoining landowners, conservation organizations or government conservation agencies.</p>	<p>Verifiers & Guidance:</p> <p>Where less than 10% of the total area of large FMUs has been set aside for conservation zones and protection areas, justification must be provided for this in the form of consultation with local experts and/or government agencies.</p> <p>For smaller FMUs the conservation zones and protection areas should exist within the FMU or in nearby landscapes.</p> <p>Plans and maps and records of completed work.</p> <p>Interviews with Forest Managers, local experts and government agencies.</p>
<p>Indicator 6.2.5</p> <p>Conservation management and protection activities are demarcated on maps, implemented and their impact monitored.</p> <p>For <u>large scale organisations</u> these will be also be documented in plans.</p> <p><u>SLIMF:</u></p> <p>Conservation management and protection activities have been determined and are demarcated on maps</p>	<p>Verifiers & Guidance:</p> <p>Plans and maps, including annual plan of operations.</p> <p>Field observations</p>
<p>Indicator 6.2.6</p> <p>Authorised hunting, fishing, grazing and collecting activities are managed to ensure they do not exceed sustainable levels and inappropriate activities are prevented</p>	<p>Verifiers & Guidance:</p> <p>Policies and procedures.</p> <p>Interviews with Forest Managers, local experts and government agencies.</p> <p>Field observations and records of collection.</p>
<p>Criterion 6.3</p> <p>Ecological functions and values shall be maintained intact, enhanced, or restored, including:</p> <ul style="list-style-type: none"> Forest regeneration and succession. Genetic, species and ecosystem diversity. Natural cycles that affect the productivity of the forest ecosystem. 	
<p>Indicator 6.3.1</p> <p>The status of the FMU with regard to:</p> <ul style="list-style-type: none"> regeneration and succession genetic, species and ecosystem diversity natural cycles <p>is known or estimated.</p> <p>6.3.1.1: The alien invasive species on the FMU are identified</p>	<p>Verifiers & Guidance:</p> <p>This requirement applies to natural forest and plantation management organisations. Compliance might involve an initial assessment and monitoring of the following:</p> <ul style="list-style-type: none"> Regeneration of natural forest areas harvested, degraded areas, fragmented areas, areas damaged by fire, conservation zones and protection areas; Impacts of past management e.g. logging, collection of NTFPs, soil erosion Distribution and status of plant communities;

	<ul style="list-style-type: none"> Conservation status of native floral and faunal assemblages, species and their habitats; Spread of invasive species Ongoing soil erosion Water quality <p>Records and maps</p> <p>Interviews with Forest Managers and local experts.</p> <p><i>Burning impacts very negatively on natural forest regeneration and succession. Fire kills and suppresses saplings. Burning of woodlands is a common practice in Zambia.</i></p> <p><i>The National Environmental Action Plan (NEAP) of 1994 lists invasive alien species as a problem, especially for the Copperbelt province.</i></p>
<p>Indicator 6.3.2</p> <p>Silvicultural and/or other management systems are appropriate for the ecology of the forest and resources available</p>	<p>Verifiers & Guidance:</p> <p>Interviews with Forest Managers and local experts</p> <p><i>Refer to 5.6.2 for South Western Zambian natural Teak Forests where DBH and seed tree retention is specified.</i></p> <p><i>In addition, the licensee may not fell any tree which has been marked by the Senior Forest Officer as a tree which may not be felled.</i></p>
<p>Indicator 6.3.3</p> <p>Ecological functions (regeneration, succession, diversity, natural cycles) are maintained and where appropriate, there is a programme for restoration of degraded sites</p> <p>6.3.3.1: When there are fewer than 100 saplings or young trees to serve as succeeding trees in natural forests, then it is obligatory to reforest the stand (reforestation by direct sowing or planting of saplings).</p> <p>6.3.3.2: There is a program for the eradication of alien invasive species and demonstrable progress can be shown.</p>	<p>Verifiers & Guidance:</p> <p><i>Enhancement, maintenance and restoration activities should be prepared to provide for the restoration of degraded natural areas, weed infestation, erosion, borrow pits, waste sites, quarries, etc.</i></p> <p>Interviews with Forest Managers, local experts.</p> <p>Plans and maps and field observations.</p> <p><i>ITTO Members are encouraged to support and develop industrial tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land.</i></p> <p><i>In the south western natural teak forests, the mixing ratio of Mukusi saplings in the young forests is low and excessive burning (forest fires) has caused a scarcity of young Mukusi trees to serve as succeeding trees. Accordingly, even if it is possible to maintain the volume of forest resources in the future, the conclusion is drawn that it would be difficult to sustain forests of a useful quality without greater effort in proliferation such as raising young Mukusi trees. The need to establish seed banks and create nurseries to generate saplings of scarce and commercially over-exploited species such as Mukusi and Mukwa is emphasized in the Japanese report (see Appendix A). This must be taken into consideration for any FSC certified logging operation in the Southern and Western Provinces of Zambia. Monitoring of natural regeneration of saplings must be carried out and trial enrichment plantings should be established, especially in areas where the forest crowns are open. See also Principle 8.</i></p> <p><i>Forest management should promote the co-existence of undergrowth (herb/shrub layer) from a soil fertility perspective. This is especially in areas where such undergrowth has been cleared or burned.</i></p>

Indicator 6.3.4	Verifiers & Guidance:
In natural and semi-natural forest, natural regeneration is preferred where adequate for the meeting of management objectives; where artificial regeneration is planned, environmental impact has been assessed (refer Criterion 6.1)	Plans and maps Interviews with Forest Managers, local experts
Criterion 6.4	Representative samples of existing ecosystems within landscapes shall be protected in their natural state and recorded on maps, appropriate to the scale of operations and the uniqueness of the resource.
Indicator 6.4.1	Verifiers & Guidance:
For the protection and recording of representative samples of existing ecosystems in the landscape, refer to Criterion 6.2.	
Criterion 6.5	Written guidelines shall be prepared and implemented to: control erosion; minimise forest damage during harvesting, road construction, and all other mechanical disturbances; and protect water resources.
Indicator 6.5.1	Verifiers & Guidance:
All environmentally sensitive forest operations are identified (see 6.1) and written guidelines defining acceptable practice are available to forest managers and supervisors; operational guidelines must meet or exceed national or regional best practice requirements <u>SLIMF:</u> All forest management operations that may damage soil (e.g. compaction, erosion) and methods to mitigate or avoid such are known.	Forest operations include: site preparation, fire belt management, planting, weed control, stand management, harvesting and extraction, road surfacing material extraction and excavation site closure, road network design, road design, construction, maintenance and closure. Records, plans and maps. Interviews with Forest Managers and field observations. <u>SLIMF:</u> Interviews with Forest Managers and field observations Maps showing new roads and locations of new and ongoing operations
Indicator 6.5.2	Verifiers & Guidance:
Guidelines developed in terms of indicator 6.5.1 are implemented during operations and planning	The main assessment report should make explicit reference to the national or regional best practice guidelines used as a reference. Operational plans, interviews with staff and field observations.
Indicator 6.5.3	Verifiers & Guidance:
Buffer zones are maintained along watercourses and around water bodies. These buffer zones are demarcated on maps and comply with specifications made in national and regional best practice guidelines <u>SLIMF:</u> Buffer zones are maintained along watercourses and around water bodies and comply with national and regional best practice guidelines	The main assessment report shall make explicit reference to the national or regional best practice guidelines used as a reference. Operational plans, interviews with staff and field observations.

Indicator 6.5.4	Verifiers & Guidance:
Operators are aware of and able to implement adequate emergency procedures for clean up following accidental oil and chemical spillages	Operational plans, interviews with staff and field observations. No evidence of significant spillages.
Criterion 6.6	Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides. World Health Organisation Type 1A and 1B chlorinated hydrocarbon pesticides; pesticides that are persistent, toxic or whose derivatives remain biologically active and accumulate in the food chain beyond their intended use; as well as any pesticides banned by international agreement, shall be prohibited. If chemicals are used, proper equipment and training shall be provided to minimise health and environmental risks.
Indicator 6.6.1	Verifiers & Guidance:
There is an up-to-date list of all pesticides used in the organisation that documents trade name, and active ingredient. Where not provided by the product label, authorised applications, application methods and rates will also be documented.	<i>Chemical pesticides include herbicides, insecticides, fungicides, and rodenticides in the formulation applied in the field (including any surfactants, dispersants or solvents used).</i> Records of chemicals in use. Receipts and invoices. Procedures for the safe and appropriate use of chemicals
Indicator 6.6.2	Verifiers & Guidance:
Prohibited pesticides are not used except where: <ul style="list-style-type: none"> a derogation of policy has been obtained from the FSC Secretariat; or a temporary exemption has been authorised in terms of FSC-POL-30-001, and its associated documents. 	<i>Refer SGS Qualifor Work Instruction 16 for:</i> <ul style="list-style-type: none"> Current list of prohibited pesticides; Derogations; Temporary derogations; and Use of prohibited chemicals for emergency situations. Chemical records
Indicator 6.6.3	Verifiers & Guidance:
Where chemicals are used on an ongoing basis the owner/manager must prepare and implement a strategy that will have at least the following components: <ul style="list-style-type: none"> reduction of use is stated as a long-term objective; a range of methods for pesticide control providing justification for chemical-use as an option; procedures that promote the optimal use of chemicals (timing, follow-up, equipment, etc) clear measurable targets for long term chemical use; with reduction as the objective; Usage is expressed per product, on a per hectare basis and sub-divided according to catchment or drainage basin. SLIMF: Record is kept of the amount of chemicals used on the FMU and there is indication that alternative methods are being considered	<i>Usage, and reduction targets should be expressed on a per hectare basis and sub-divided according to operations and catchment/drainage basin; targets should be quantitative</i> <i>Some organisations may be allowed to increase use of certain chemical pesticides in the short or medium term, where the use of these pesticides is justified on social or environmental grounds, see 6.6.</i> This requirement applies to nurseries located on the certified FMU. Documented long term strategy Chemical use records.

leading to a reduction in use of the long term	
Indicator 6.6.4	Verifiers & Guidance:
(Not applicable to SLIMF)	<i>Pesticides may be preferred in some instances, for example, to eliminate invasive weeds, control vectors of serious human diseases.</i>
Where pesticides are the preferred method of control for environmental or social reasons, the consideration of alternatives and justification for their use has been determined and documented in cooperation with acknowledged experts	Interviews with Forest Managers and local experts. Documented justification.
Indicator 6.6.5	Verifiers & Guidance:
All transport, storage, handling, application and emergency procedures for clean up following accidental spillages of chemical pesticides comply, as a minimum, with the ILO publications 'Safety & Health in the Use of Agrochemicals: A Guide', and 'Safety in the Use of Chemicals at Work'	Procedures and records. Interviews with staff
Criterion 6.7	Chemicals, containers, liquid and solid non-organic wastes including fuel and oil shall be disposed in an environmentally appropriate manner at off-site locations.
Indicator 6.7.1	Verifiers & Guidance:
The owner/manager should ensure that non-organic wastes (e.g. oil, tyres, containers, etc.), including those generated by contractors working on the FMU are recycled where recycling is possible	Field observations and interviews with staff
Indicator 6.7.2	Verifiers & Guidance:
The owner/manager should ensure that waste that cannot be re-cycled, including that generated by contractors working on the FMU, is disposed of in environmentally appropriate ways.	<i>Waste includes:</i> <ul style="list-style-type: none"> ▪ Surplus chemicals ▪ Chemical containers ▪ Plastic waste ▪ Fuels and lubricants ▪ Worn vehicle tyres ▪ Used vehicle batteries ▪ Waste produced from processing operations ▪ Domestic Evidence that waste has been disposed off in an acceptable manner.
Indicator 6.7.3	Verifiers & Guidance:
The owner/manager should ensure that the handling and disposal of chemicals and chemical containers, including that generated by contractors working on the FMU, should comply, as a minimum, with the ILO publications 'Safety & Health in the Use of Agrochemicals: A Guide',	Interviews with staff

and 'Safety in the Use of Chemicals at Work'	
Indicator 6.7.4	Verifiers & Guidance:
On-site facilities for easy collection of waste are provided	Presence of waste receptacles or other
Criterion 6.8	Use of biological control agents shall be documented, minimised, monitored and strictly controlled in accordance with national laws and internationally accepted scientific protocols. Use of genetically modified organisms shall be prohibited.
Indicator 6.8.1	Verifiers & Guidance:
The use of biological control agents is avoided or minimised by making use of best available alternative control methods not entailing excessive cost	Interviews with Forest Managers. Policies and procedures.
Indicator 6.8.2	Verifiers & Guidance:
Any use of biological control agents must be supported by documented justification which details: alternative methods of pest or disease control considered, ecological impact assessment, relevant organisations and regulatory authorities consulted	Documentation
Indicator 6.8.3	Verifiers & Guidance:
All activities where biological control agents are used are documented and monitored	Documentation
Indicator 6.8.4	Verifiers & Guidance:
No genetically modified organisms are used in management, production or research programmes within the FMU.	Interviews with staff. Records of biological material sources and supplies
Criterion 6.9	The use of exotic species shall be controlled and actively monitored to avoid adverse ecological impacts
Indicator 6.9.1	Verifiers & Guidance:
Exotic species are assessed for adverse ecological impacts and such impacts avoided	Records of scientific studies. Interviews with Forest Managers
Indicator 6.9.2	Verifiers & Guidance:
Unwanted regeneration is monitored, and if necessary controlled	Monitoring records

Criterion 6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion: <ol style="list-style-type: none"> entails a very limited portion of the forest management unit; and does not occur on high conservation value forest areas; and will enable clear, substantial, additional, secure, long-term conservation benefits across the forest management unit. 	
Indicator 6.10.1 Forest conversion, if any, is limited to small areas (and its extent is acceptable to conservation organisations, regulatory authorities) and/or is of negligible environmental impact	Verifiers & Guidance: <i>Clear felling and replanting of a natural or semi-natural forest with a mixture native species in the absence of satisfactory natural regeneration is not considered forest conversion to plantation. Clear felling and replanting of a natural or semi-natural forest with an exotic species is considered conversion.</i> <i>The clearance of isolated single trees or pockets of natural vegetation less than 0.001 ha to consolidate plantation blocks or for essential infrastructure development is only permitted where acknowledged experts and regulatory authorities have been consulted and find it acceptable.</i> Interviews with Forest Managers, local experts and government agencies. Plans and maps. Field observations.
Indicator 6.10.2 Conversion and afforestation do not occur in conservation zones, protection areas (see 6.2) or areas retained as representative of existing ecosystems (see 6.2)	Verifiers & Guidance: Interviews with Forest Managers, local experts and government agencies. Plans and maps. Field observations.
Indicator 6.10.3 Conservation benefits of conversion to non-forest land use or afforestation or compensatory conservation activities planned have been identified and assessed in cooperation with acknowledged experts; in the case of compensatory conservation activities, their extent is acceptable to conservation organisations, regulatory authorities	Verifiers & Guidance: <i>Conversion may, for example, have a net conservation benefit where an area is converted back to its original natural or semi-natural habitat type such as open wetland or grassland.</i> Interviews with Forest Managers, local experts and government agencies.
Indicator 6.10.4 Conservation benefits are substantial, additional, secure, and long term	Verifiers & Guidance: Scientific evidence and interviews with Forest Managers and local experts

PRINCIPLE 7. MANAGEMENT PLAN:

A management plan - appropriate to the scale and intensity of the operations - shall be written, implemented, and kept up to date. The long-term objectives of management, and the means of achieving them, shall be clearly stated.

Criterion 7.1 The management plan and supporting documents shall provide:

- a) management objectives;
- b) description of the forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions, and a profile of adjacent lands;
- c) rationale for rate of annual harvest and species selection;
- d) provisions for monitoring of forest growth and dynamics;
- e) environmental safeguards based on environmental assessments;
- f) plans for the identification and protection of rare, threatened and endangered species;
- g) maps describing the forest resource base including protected areas, planned management activities and land ownership;
- h) description and justification of harvesting techniques and equipment to be used.

Indicator 7.1.1

There is a management plan (or overview linking different planning documents)

SLIMF:

Management plans may consist of brief notes and a map

Verifiers & Guidance:

Management plan

SLIMF:

Checking the plan exists and contains all the information required.

Field checks that the plan has been implemented in the past and is currently still followed.

Indicator 7.1.2

Management objectives are clearly described

SLIMF:

An outline is provided of objectives and how these will be achieved

Verifiers & Guidance:

Management plan

Indicator 7.1.3

Forest resources, attributes of any high conservation value forest, environmental limitations, special characteristics of the forest, land use and ownership status, socio-economic conditions, and adjacent lands are described

SLIMF:

The forest is broadly described

Verifiers & Guidance:

Management plan

Indicator 7.1.4

Rate of harvest, species selection, management prescriptions (for production and conservation zones) and operational techniques are documented and justified

Verifiers & Guidance:

Management plan

SLIMF:

Harvest limits are established at sustainable limits and are based

<p>SLIMF:</p> <p>Sustainable harvest limits and regeneration plans (long term, at least one full rotation period for the whole of the FMU) are provided</p>	<p>on conservative estimates of tree growth and yield.</p> <p>Silvicultural prescriptions take into account factors such as DBH, seed trees for each species, etc.</p>
<p>Indicator 7.1.5</p> <p>Provisions for monitoring forest growth and dynamics are described</p> <p>SLIMF:</p> <p>The plans include provisions for monitoring forest regrowth</p>	<p>Verifiers & Guidance:</p> <p>Management plan</p>
<p>Indicator 7.1.6</p> <p>Refer Criterion 6.1 for description of environmental safeguards</p>	<p>Verifiers & Guidance:</p>
<p>Indicator 7.1.7</p> <p>Refer 6.2 for conservation planning and provision for RTE species.</p>	<p>Verifiers & Guidance:</p>
<p>Indicator 7.1.8</p> <p>The pest management strategy is documented and describes and justifies objectives, control methods and precautions.</p> <p>Refer Criterion 6.6 for pest management</p>	<p>Verifiers & Guidance:</p>
<p>Indicator 7.1.9</p> <p>Any control of wild animals is based on a written strategy, which describes and justifies objectives, cull targets, control methods and precautions; control is carried out in consultation with all relevant stakeholders.</p> <p>SLIMF:</p> <p>Refer Criterion 6.2</p>	<p>Verifiers & Guidance:</p> <p>Written strategy and communication with interested and affected parties.</p> <p>Interviews with Forest Managers and consultation with local stakeholders, experts and government agencies.</p>
<p>Indicator 7.1.10</p> <p>There are appropriate maps (at a scale appropriate for planning and supervision activities) showing the forest resource base including protected areas, watercourses, roads and other features important for forest management. Maps should be prepared prior to commencement of harvesting and road construction</p> <p>SLIMF:</p> <p>There are appropriate maps showing the forest resource base including protected areas,</p>	<p>Verifiers & Guidance:</p> <p>Maps and associated records</p> <p><i>In the case of concessions, the licence area is subdivided into compartments of between 85 and 100 ha in size.</i></p> <p><i>The construction of management roads which also serve as fire breaks (6m wide) along the boundary between the forests and other land use so as to surround the forests is recommended.</i></p>

<p>watercourses, roads and ownership.</p> <p>In the case of concessions in natural forests:</p> <p>7.1.10.1 The compartment boundaries of the proposed cutting site must be demarcated either by clearing or burning lines, or using natural features.</p> <p>7.1.10.2: The licensee has taken all of the necessary steps to prevent fires, and has maintained fire breaks.</p>	
<p>Indicator 7.1.11</p> <p>Harvesting techniques and equipment are described and justified</p> <p>SLIMF:</p> <p>The plan describes harvesting methods and silviculture to ensure responsible management</p> <p>7.1.11.1: In concession areas, trees are only felled in one compartment at a time, unless authorisation has been given in writing by the Senior Forest Officer.</p>	<p>Verifiers & Guidance:</p> <p>Management plan and operational controls.</p> <p>Interviews with staff</p>
<p>Indicator 7.1.12</p> <p>For large scale operations, planning includes short (operational/annual), medium (tactical/3-5 yearly) and long (strategic, rotation/harvesting cycle) term plans covering all operations and these shall be documented.</p> <p>For small-scale operations a long-term plan covering harvesting operations will be documented. The requirement for documented planning in small-scale operations will be decided by the scale, duration and intensity of the operation.</p> <p>SLIMF:</p> <p>Only a long term plan as outlined in Indicators 7.1.2 to 7.1.11 is required.</p>	<p>Verifiers & Guidance:</p> <p>Management plan and operational controls.</p> <p>Interviews with staff</p> <p><i>In the case of concessions, by October every year, the licensee must submit to the Senior Forest Officer, a plan of operation, specifying the work to be carried out in the following year. The plan of operation must have the following information:</i></p> <ul style="list-style-type: none"> ▪ <i>The compartment to be exploited and the order in which they will be operated</i> ▪ <i>The tree species and quantities to be removed from each compartment</i> ▪ <i>Any roads to be constructed or used</i> ▪ <i>The sites of log depots and main camps to be used</i>
<p>Indicator 7.1.13</p> <p>Plans are being implemented and any deviation from prescription or rate of progress is adequately justified; overall objectives will still be achieved and the ecological integrity of the forest maintained</p> <p>SLIMF:</p> <p>Plans are being implemented and deviations (whilst maintaining long term objectives) can be explained</p>	<p>Verifiers & Guidance:</p> <p>Management plan and operational controls.</p> <p>Interviews with staff</p>

Criterion 7.2		The management plan shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social and economic considerations.	
Indicator 7.2.1		Verifiers & Guidance:	
In large scale organisations, staff members with responsibility for the overall compilation and updating of the management plan are identified		Company procedures	
Indicator 7.2.2		Verifiers & Guidance:	
(Not applicable to SLIMF)		Publications	
New scientific and technical developments in production forestry and biodiversity conservation are available at the FMU or Forest Managers have access to this information		Interviews with Forest Managers	
Indicator 7.2.3		Verifiers & Guidance:	
There is evidence that scientific and technical developments and results of monitoring are incorporated into revisions of policies, procedures and plans.		Interviews with Forest Managers, scientific evidence.	
<u>SLIMF:</u>		Evidence of revised planning	
There is evidence that scientific and technical developments and results of monitoring are incorporated into revisions of plans.		<i>The Japanese study (see Appendix A) urgently recommends reforestation tests. It was stated that the most required basic thing is to perfect the individual techniques and systems for the establishment of forests such as the nursing, planting in the forests, re-forestation by direct sowing etc. Zambia has no specifications for the formation of forests. To enable quick development of these techniques, it was recommended that nurseries and experimental forests be established and the required techniques realised.</i>	
Indicator 7.2.4		Verifiers & Guidance:	
There is evidence that changing environmental, social and economic considerations have been included in the revision of the management plan		Interviews with Forest Managers, scientific evidence.	
		Evidence of revised planning	
Indicator 7.2.5		Verifiers & Guidance:	
In large scale operations a timetable for the periodic revision of the management plan is documented and adhered to		Management revision timetable and status of current management plan	
Criterion 7.3		Forest workers shall receive adequate training and supervision to ensure proper implementation of the management plan	
Indicator 7.3.1		Verifiers & Guidance:	
Forest workers at all levels of skill and responsibility are appropriately educated and trained in the tasks they are assigned to and company policy and procedures.		Training records	
<u>SLIMF:</u>		Interviews with workers and management	
Forest workers at all levels of skill and responsibility are appropriately trained in the		Field observations	
		<i>In the case of a concession, the licensee must employ among the key personnel a qualified forester to supervise all of the site works related to felling. The Senior Forest Officer must approve any proposed replacement of such key personnel.</i>	

tasks they are assigned to.	
Indicator 7.3.2	Verifiers & Guidance:
(Not applicable to SLIMF)	Training records
Managers and supervisors (including those employed by contractors) have received adequate education, training or experience to ensure that they are able to plan and organize forestry operations in accordance with organisations' plans, policies and procedures	Interviews with staff
Indicator 7.3.3	Verifiers & Guidance:
All activities are supervised and monitored sufficiently to ensure that plans, policies, procedures and contract specifications (for contractors) are adequately implemented	Operational procedures
	Interviews with staff.
Indicator 7.3.4	Verifiers & Guidance:
Evidence of formal or informal training exists in the field	Interviews with workers and field observations
Indicator 7.3.5	Verifiers & Guidance:
In <u>large scale organisations</u> a formal long-term training plan should be available	Strategic training plan
Criterion 7.4	While respecting the confidentiality of information, forest managers shall make publicly available a summary of the primary elements of the management plan, including those listed in Criterion 7.1 above.
Indicator 7.4.1	Verifiers & Guidance:
There are publicly available statements that provide an up-to-date summary of the primary management plan elements listed in 7.1 at company level	Public Summary of Management Plan
<u>SLIMF:</u>	<u>SLIMF:</u>
The management plan, or a summary of it (which includes the information required by Indicators 7.1.2 to 7.1.11 is available for the public to see on request.	Management Plan is available

PRINCIPLE 8. MONITORING AND ASSESSMENT:

Monitoring shall be conducted - appropriate to the scale and intensity of forest management - to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

Criterion 8.1 The scale and intensity of forest management operations as well as the relative complexity and fragility of the affected environment should determine the frequency and intensity of monitoring. Monitoring procedures should be consistent and replicable over time to allow comparison of results and assessments of change.

Indicator 8.1.1

All activities that require monitoring are identified.

For large scale organisations these shall be documented in a monitoring programme.

Verifiers & Guidance:

Interviews with Management and environmental specialists/stakeholders

Monitoring programme

The need to establish seed banks and create nurseries to generate saplings of scarce and commercially over-exploited species such as Mukusi and Mukwa is emphasized in the Japanese report (see Appendix A). This must be taken into consideration for any FSC certified logging operation in the Southern and Western Provinces of Zambia. Monitoring of natural regeneration of saplings must be carried out and trial enrichment plantings should be established.

Indicator 8.1.2

The frequency, intensity and expense of monitoring are defined and is appropriate to the scale and intensity of the forest management operations and the sensitivity of the receiving environment

SLIMF:

Monitoring should be done in a consistent and replicable way over time to allow comparison of results and assessment of change.

Verifiers & Guidance:

Monitoring programmes

SLIMF:

Manager's field notes

Manager's description of how monitoring is done.

Indicator 8.1.3

(Not applicable to SLIMF)

Consistent and replicable monitoring procedures for each activity are documented in the programme and implemented, allowing for comparison and change over time.

Verifiers & Guidance:

Monitoring procedures

Interviews with Forest Managers and local experts

Indicator 8.1.4

Monitoring information is readily available and in a format that facilitates effective auditing and certification by third parties

Verifiers & Guidance:

Monitoring records, reports and archival system.

Internal audit records

CAR records

Indicator 8.1.5

Corrective actions identified through the monitoring process are appropriately implemented and closed out

Verifiers & Guidance:

Corrective action documentation

Criterion 8.2	<p>Forest management <u>should</u> include the research and data collection needed to monitor, at a minimum, the following indicators:</p> <ul style="list-style-type: none"> ▪ yield of all forest products harvested; ▪ growth rates, regeneration and condition of the forest; ▪ composition and observed changes in the flora and fauna; ▪ environmental and social impacts of harvesting and other operations; ▪ costs, productivity, and efficiency of forest management.
Indicator 8.2.1	Verifiers & Guidance:
<p>Yields of all forest products harvested are recorded</p>	<p>Harvesting records</p> <p><i>See 5.6.3.1: All head loads of thatching grass cut under a licence must be stacked in stacks of 10 head load bundles (off-take is then recorded).</i></p>
Indicator 8.2.2	Verifiers & Guidance:
<p>A timber resource inventory is conducted, appropriate to the scale and intensity of forest management</p> <p><u>SLIMF:</u></p> <p>The manager knows what information they need in order to judge progress towards their objectives. The information is collected and recorded.</p> <p>In all cases this will include:</p> <ul style="list-style-type: none"> ▪ Amount of products harvested ▪ Effects of operations as identified under C6.1 ▪ Changes in features identified under C6.2 ▪ At least annual monitoring of high conservation values identified under C 9.1 ▪ Invasive exotic species 	<p>Data are collected on growth rates, regeneration, and yield of all forest products harvested as well as the condition of the forest (data accuracy is appropriate to scale and intensity of management)</p> <p>Documented inventory</p> <p><u>SLIMF:</u></p> <p>Discussions with forest manager.</p> <p>Evidence of the manager's knowledge of the forest and proactive approach to field observation and field notes</p> <p>Review of manager's field notes, observations or reports on HCVs.</p> <p>Available maps and reports from other sources</p>
Indicator 8.2.3	Verifiers & Guidance:
<p>Where non-timber products are used, a resource inventory is conducted, appropriate to the scale and intensity of forest management</p> <p><u>SLIMF:</u></p> <p>The sustainable harvest levels of non-timber forest products is known</p>	<p>Documented Inventory</p> <p><u>SLIMF:</u></p> <p>Interviews with the Forest Manager and field observations</p>
Indicator 8.2.4	Verifiers & Guidance:
<p>(Not applicable to SLIMF)</p> <p>Data are collected on the composition and observed changes in the flora and fauna and the effectiveness of conservation activities, particularly of rare, threatened and endangered species</p>	<p>Data</p> <p><u>SLIMF:</u></p> <p>Interviews with Forest Managers</p>

Indicator 8.2.5	Verifiers & Guidance:
Indicators of environmental and social impacts of forest operations, including health and safety, are determined and monitoring data collected	Data
<u>SLIME:</u> The forest manager is aware of the social impacts of operations and mitigate these where they are negative	Interviews with Forest Managers and consultation with local communities <i>It is crucial that the number of livestock allowed to graze in the forests be kept down to a suitable level. In particular, care must be taken with grazing by goats as there is a high risk of overgrazing. Carrying capacities need to be determined and grazing monitored. Overgrazing has been identified as one of the major threats to natural forests.</i>
Indicator 8.2.6	Verifiers & Guidance:
Data are collected on any wild mammals culled	Data
Indicator 8.2.7	Verifiers & Guidance:
Post-harvest monitoring is carried out to assess waste and damage to the site.	Interviews with Forest Managers and supervisors.
For <u>large scale operations</u> this monitoring shall be documented.	Field observations Post-harvest monitoring record
Indicator 8.2.8	Verifiers & Guidance:
The owner/manager records and analyses data on the costs, productivity and efficiency of forest management activities; the results of such analyses are incorporated into plans	Data and records
Indicator 8.2.9	Verifiers & Guidance:
Contractors' performance is monitored, including compliance with contract specifications.	Interviews with Forest Managers and contractors.
In <u>large scale organisations</u> , formal auditing of contractors shall be carried out on a regular basis and records thereof maintained	Audit documents
Indicator 8.2.10	Verifiers & Guidance:
Waste disposal sites within the FMU are regularly checked	Interviews with Forest Managers and field observations
Criterion 8.3	Documentation shall be provided by the forest manager to enable monitoring and certifying organisations to trace each forest product from its origin, a process known as the "chain of custody."
Indicator 8.3.1	Verifiers & Guidance:
There is a procedure for identifying all products (timber and non-timber) leaving the forest so that the recipient can easily determine the forest of origin.	<i>The scope of a joint FM/CoC certificate covers harvesting and transportation of roundwood to the first point of sale, unloading or processing. On site processing e.g. charcoal burning, use of a mobile saw-bench, or purchase and harvesting of standing timber by a third party (e.g. sawmill, harvesting contractor, timber</i>

<p>For large scale organisations this procedure shall be documented.</p>	<p><i>merchant) must be covered by a separate chain of custody certificate if the products are to be sold as certified.</i></p> <p>Interview with Forest Managers</p> <p>Procedures.</p> <p><i>In the case of a concession, the following should be taken into consideration in the procedure (see 1.1.2.1):</i></p> <ul style="list-style-type: none"> ▪ <i>The licensee must measure and record every timber log removed from the compartment and the Forest officer must mark one end of the log.</i> ▪ <i>The licensee must submit returns of his logging on the 5th day of every month. These returns must show the number of trees, volume and number of logs by tree species removed from the compartment. The compartment number is recorded.</i> ▪ <i>All sawn timber must be hammer marked by a Forest Officer before being removed from the sawmill site.</i>
<p>Indicator 8.3.2</p> <p>Documentation of origin and destination of all certified forest products is available for products held at landing areas, stacking areas and processing sites on the FMU</p>	<p>Verifiers & Guidance:</p> <p>Delivery notes, receipts and stock records</p>
<p>Indicator 8.3.3</p> <p>Sales invoices and other documentation related to sales of certified material include the chain of custody certificate number, in the correct format (SGS-FM/CoC-XXXX)</p>	<p>Verifiers & Guidance:</p> <p>Sales invoices</p>
<p>Indicator 8.3.4</p> <p>Records are kept of the total quantities of all products sold, as well as of quantities sold to any chain-of-custody certificate holders</p>	<p>Verifiers & Guidance:</p> <p>Sales records, invoices</p>
<p>Indicator 8.3.5</p> <p>Use of the FSC trademark is in accordance with policy and has been approved by SGS Qualifor</p>	<p>Verifiers & Guidance:</p> <p>Samples of trademark use</p>
<p>Criterion 8.4 The results of monitoring shall be incorporated into the implementation and revision of the management plan.</p>	
<p>Indicator 8.4.1</p> <p>The results of research and monitoring programmes are regularly analysed and incorporated into planning on a regular basis</p> <p><u>SLIMF:</u></p> <p>Refer Indicators 7.2.3 and 7.2.4</p>	<p>Verifiers & Guidance:</p> <p>Interviews with local experts and Forest Managers.</p> <p>Forest planning documents</p>
<p>Indicator 8.4.2</p>	<p>Verifiers & Guidance:</p>

<p>There is evidence that monitoring results are used to improve forest management</p> <p>SLIMF:</p> <p>Refer Indicators 7.2.3 and 7.2.4</p>	<p>Interviews with local experts and Forest Managers</p>
<p>Criterion 8.5 While respecting the confidentiality of information, forest managers shall make publicly available a summary of the results of monitoring indicators, including those listed in Criterion 8.2.</p>	
<p>Indicator 8.5.1</p> <p>Results and/or summaries of monitoring programmes (including those listed in Criterion 8.2) are available to the public within the accepted norms of commercial confidentiality.</p> <p>SLIMF:</p> <p>Refer Indicator 7.4.1</p>	<p>Verifiers & Guidance:</p> <p>Public summary</p>
<p>PRINCIPLE 9. MAINTENANCE OF HIGH CONSERVATION VALUE FORESTS:</p> <p>Management activities in high conservation value forests shall maintain or enhance the attributes, which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.</p>	
<p>Criterion 9.1 Assessment to determine the presence of the attributes consistent with High Conservation Value Forests will be completed, appropriate to scale and intensity of forest management</p>	
<p>Indicator 9.1.1</p> <p>The FMU has been adequately assessed (in consultation with conservation organisations, regulatory authorities and other local and national stakeholders) and any HCVFs and their biological and/or socio-economic or cultural attributes have been identified</p> <p>SLIMF:</p> <p>The FMU has been adequately assessed (in consultation with conservation organisations and regulatory authorities) and any HCVFs and their biological and/or socio-economic or cultural attributes have been identified</p>	<p>Verifiers & Guidance:</p> <p><i>This requirement must be applied to all forests undergoing assessment. HCVFs possess one or more the following attributes:</i></p> <ul style="list-style-type: none"> ▪ Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values and/or large landscape level forests where viable populations of most/all naturally occurring species exist in natural patterns of distribution and abundance; ▪ Rare, threatened or endangered ecosystems; ▪ Forests that provide basic ecological services in critical situations (e.g. water quality or flow, protection against erosion or natural disasters such as cyclones or hurricanes, pollinators); ▪ Forests fundamental to meeting basic economic or bio-physiological needs of local communities or critical to local community cultural identity. <p>Interviews with Forest Managers and local experts.</p> <p>Evidence of assessments.</p>
<p>Indicator 9.1.2</p> <p>For large scale organisations the assessment procedure should be documented and records of consultation maintained</p>	
	<p>Verifiers & Guidance:</p> <p>Documented procedures and records</p>

Criterion 9.2 The consultative portion of the certification process must place emphasis on the identified conservation attributes, and options for the maintenance thereof.	
Indicator 9.2.1	Verifiers & Guidance:
The owner/manager has determined appropriate management prescriptions for the HCVF in consultation with (and acceptable to) conservation organisations, regulatory authorities and other local and national stakeholders	Management plans and maps
<u>SLIMF:</u>	Consultation with stakeholders and/or government agencies or evidence of input by these agents
The owner/manager has determined appropriate management prescriptions for the HCVF in consultation with (and acceptable to) conservation organisations and regulatory authorities.	
Indicator 9.2.2	Verifiers & Guidance:
When an HCVF has been identified for its socio-economic or cultural attributes, there should be joint analysis and decision-making with the stakeholders directly affected; all efforts should be made to establish co-management agreements with these stakeholders	Interviews with Forest Managers, local experts and communities.
	Affected communities/persons are listed on the stakeholder list (refer Criterion 4.4).
Criterion 9.3 The management plan shall include and implement specific measures that ensure the maintenance and/or enhancement of the applicable conservation attributes consistent with the precautionary approach. These measures shall be specifically included in the publicly available management plan summary.	
Indicator 9.3.1	Verifiers & Guidance:
All biological and/or social attributes of any HCVF identified are described in the management plan	Management plan
Indicator 9.3.2	Verifiers & Guidance:
The plan describes the specific measures to be taken to enhance the identified attributes (see also Criterion 7.1)	Management plan
Indicator 9.3.3	Verifiers & Guidance:
All measures are described in the public summary of the plan	Management plan
Indicator 9.3.4	Verifiers & Guidance:
When an HCVF has been identified for biological values, management should:	Management plans and maps.
▪ maintain natural patterns of distribution and abundance of species,	Interviews with Forest Managers and local experts.
▪ maintain natural evolutionary and ecological processes (biotic and abiotic, including	Field observations.

disturbance), ▪ avoid fragmentation, and set aside core areas for strict protection	
Indicator 9.3.5 Critically endangered forest landscapes must be subject to complete protection (i.e. no harvesting)	Verifiers & Guidance: Management plans and maps. Interviews with Forest Managers and local experts
Criterion 9.4 Annual monitoring shall be conducted to assess the effectiveness of the measures employed to maintain or enhance the applicable conservation attributes.	
Indicator 9.4.1 Monitoring indicators and frequency are defined in consultation with acknowledged experts, local and national stakeholders to monitor effectiveness of each measure described in the plan <u>SLIMF:</u> Refer Indicator 8.2.2	Verifiers & Guidance: Interviews with Forest Managers and local experts
Indicator 9.4.2 Records of monitoring are kept and used, in consultation with acknowledged experts, local and national stakeholders, to adapt future management <u>SLIMF:</u> Records of monitoring are kept and used, in consultation with conservation and government agencies, to adapt future management	Verifiers & Guidance: Records of monitoring
Indicator 9.4.3 Managers are aware of research developments which might contribute to management of HCVFs	Verifiers & Guidance: Scientific evidence. Interviews with Forest Managers and local experts
Indicator 9.4.4 Managers are actively monitoring research developments which might contribute to management of HCVFs <u>SLIMF:</u> Managers are actively communicating with conservation and government agencies to access research developments which might contribute to management of HCVFs	Verifiers & Guidance: Scientific evidence. Interviews with Forest Managers and local experts

PRINCIPLE 10. PLANTATIONS:

Plantations shall be planned and managed in accordance with Principles and Criteria 1 - 9, and Principle 10 and its Criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

Criterion 10.1 The management objectives of the plantation, including natural forest conversion and restoration objectives, shall be explicitly stated in the management plan, and clearly demonstrated in the implementation of the plan.

Indicator 10.1.1

The management plan of the plantation explicitly states the management objectives for the plantation itself, as well as for natural forest conversion and restoration (see also Criterion 7.1)

Verifiers & Guidance:

"Natural forest" can be also be interpreted as natural vegetation.

Forest Management Plan

Interviews with Forest Managers and local experts.

Indicator 10.1.2

The achievement of the objectives can be clearly demonstrated

Verifiers & Guidance:

Interviews with Forest Managers and local experts.

Field observations

Criterion 10.2 The design and layout of plantations should promote the protection, restoration and conservation of natural forests, and not increase pressures on natural forests. Wildlife corridors, streamside zones and a mosaic of stands of different ages and rotation periods, shall be used in the layout of the plantation, consistent with the scale of the operation. The scale and layout of plantation blocks shall be consistent with the patterns of forest stands within the natural landscape.

Indicator 10.2.1

Natural vegetation areas within the FMU are identified and demarcated on maps and such areas within the landscape are known and considered during planning

Verifiers & Guidance:

Maps

Indicator 10.2.2

For protection, restoration and conservation of natural forest and wildlife corridors, refer to Criteria 6.2

Verifiers & Guidance:**Indicator 10.2.3**

Buffer zones are maintained along watercourses and around water bodies; these buffer zones are demarcated on maps and comply with specifications made in national and regional best practice guidelines. Refer indicator 6.5.3.

Verifiers & Guidance:**Indicator 10.2.4**

The scale and layout of existing and new plantation blocks are consistent with the patterns of forest stands within the natural

Verifiers & Guidance:

Maps and field observations

landscape.	
Criterion 10.3	Diversity in the composition of plantations is preferred, so as to enhance economic, ecological and social stability. Such diversity <u>may</u> include the size and spatial distribution of management units within the landscape, number and genetic composition of species, age classes and structures.
Indicator 10.3.1	Verifiers & Guidance:
Plantation planning and reestablishment make provision for diversity in species and/or provenances and/or clones to achieve optimal economic, ecological and social stability; restructuring of even-aged and/or stands low in diversity is carried out where necessary	Forest plans and maps Field observations
Indicator 10.3.2	Verifiers & Guidance:
Maximum clear-cut size is defined. Documented justification should be provided where there are potential adverse environmental or socio-economic impacts	Policies and procedures.
<u>SLIMF:</u>	<u>SLIMF:</u>
Maximum clear-cut size is defined and justified.	Interviews with Forest Managers and field observations
Criterion 10.4	The selection of species for planting shall be based on their overall suitability for the site and their appropriateness to the management objectives. In order to enhance the conservation of biological diversity, native species are preferred over exotic species in the establishment of plantations and the restoration of degraded ecosystems. Exotic species, which shall be used only when their performance is greater than that of native species, shall be carefully monitored to detect unusual mortality, disease, or insect outbreaks and adverse ecological impacts.
Indicator 10.4.1	Verifiers & Guidance:
Selection of species, provenances and clones is based on documented trials that demonstrate their suitability to the site and management objectives	Scientific evidence and interviews with local experts
<u>SLIMF:</u>	<u>SLIMF:</u>
The species chosen for plantations are suited to the site and matched to the objectives.	Discussions with manager about plantation objectives Plans for future planting
Indicator 10.4.2	Verifiers & Guidance:
Exotic species are used only where they outperform native species in meeting management objectives	Scientific evidence and interviews with local experts
Indicator 10.4.3	Verifiers & Guidance:
Information is available on seed sources and these can be traced to the stand data	Plant records

Criterion 10.5 A proportion of the overall forest management area, appropriate to the scale of the plantation and to be determined in regional standards, shall be managed so as to restore the site to a natural forest cover.	
Indicator 10.5.1 There is sufficient evidence that an appropriate proportion of the overall forest management area is managed so as to restore the site to a natural forest cover. Refer Criterion 6.2 <u>SLIMF:</u> Improvements to the ecological value of the plantation are made where conservation features exist.	Verifiers & Guidance: <u>SLIMF:</u> Field observations of conservation features Plans for future improvements
Criterion 10.6 Measures shall be taken to maintain or improve soil structure, fertility and biological activity. The techniques and rate of harvesting, road and trail construction and maintenance, and the choice of species shall not result in long term soil degradation or adverse impacts on water quality, quantity or substantial deviation from stream course drainage patterns	
Indicator 10.6.1 There is information on all soil types in the plantation area that indicate their susceptibility to degradation from forest operations and appropriate plantation species; <u>Small growers</u> and SLIMF can demonstrate their efforts to get access to adequate information on soil types occurring within the managed area.	Verifiers & Guidance: Interviews with Forest Managers and local experts. Documented site information. Evidence that site information is being used in planning of operations.
Indicator 10.6.2 Where soils are degraded from previous activities, there are plans to restore them	Verifiers & Guidance: Soil degradation through erosion, oil and chemical spills, etc. Interviews with Forest Managers and field observations.
Indicator 10.6.3 Major water resources within the forest area are identified	Verifiers & Guidance: Maps and interviews with Forest Managers
Indicator 10.6.4 For impacts on soil and other biophysical aspects, refer also to Criteria 6.1 and 6.5	Verifiers & Guidance:
Criterion 10.7 Measures shall be taken to prevent and minimise outbreaks of pests, diseases, fire and invasive plant introductions. Integrated pest management shall form an essential part of the management plan, with primary reliance on prevention and biological control methods rather than chemical pesticides and fertilisers. Plantation management <u>should</u> make every effort to move away from chemical pesticides and fertilisers, including their use in nurseries. The use of chemicals is also covered in Criteria 6.6 and 6.7.	
Indicator 10.7.1	Verifiers & Guidance:

<p>The principle forest pests and diseases are identified.</p> <p>For <u>large scale organisations</u> these shall be documented.</p>	
Indicator 10.7.2	Verifiers & Guidance:
<p>There is a documented pest and invasive plant management strategy</p> <p>(For chemical use refer to Criterion 6.6)</p>	
Indicator 10.7.3	Verifiers & Guidance:
<p>Effective control and remedial action is taken in the event of a pest, disease or invasive plant problem.</p> <p>For <u>large scale organisations</u> these actions shall be documented.</p>	<p>Interview with Forest Managers and staff.</p> <p>Documentation</p>
Indicator 10.7.4	Verifiers & Guidance:
<p>Where required, adequate effective measures are taken to protect the forest from fire.</p> <p>For <u>large scale organisations</u> there is regular monitoring of fire readiness that test all procedures</p>	<p><i>These measure will include documented* procedures for fire suppression that include definition of responsibilities and reporting lines.</i></p> <p>Interviews with staff and records of training.</p> <p>Fire readiness and control procedures.</p>
Criterion 10.8	Appropriate to the scale and diversity of the operation, monitoring of plantations, shall include regular assessment of potential on-site and off-site impacts, (e.g. natural regeneration, effects on water resources and soil fertility, and impacts on local welfare and social well-being), in addition to those elements addressed in principles 8, 6 and 4. No species <u>should</u> be planted on a large scale until local trials and/or experience have shown that they are ecologically well-adapted to the site, are not invasive, and do not have significant negative ecological impacts on other ecosystems. Special attention will be paid to social issues of land acquisition for plantations, especially the protection of local rights of ownership, use or access.
Indicator 10.8.1	Verifiers & Guidance:
For potential on-site impacts, see Criteria 6.1 and 6.5	
Indicator 10.8.2	Verifiers & Guidance:
<p>(Not applicable to SLIMF)</p> <p>Potential biophysical off-site impacts shall be monitored on a regular basis. Evidence of consultation with affected parties in terms of these impacts should be available</p>	<p>Off-site impacts may include:</p> <ul style="list-style-type: none"> ▪ Spread of exotic plantation species. ▪ Unwanted natural regeneration of native plantation species ▪ Effects on water resources ▪ Effects on soil fertility ▪ Impacts on the aesthetics of the landscape <p>Interviews with Forest Managers and local communities and/or experts.</p>

		Evidence of consultation.
Indicator 10.8.3	Verifiers & Guidance:	
For exotic or invasive species issues, see Criterion 6.9 and 10.7		
Indicator 10.8.4	Verifiers & Guidance:	
For social impacts, see Criteria 2.1, 2.2, 4.2 and 4.4		
Criterion 10.9	Plantations established in areas converted from natural forests after November 1994 normally shall not qualify for certification. Certification may be allowed in circumstances where sufficient evidence is submitted to the certification body that the manager/owner is not responsible directly or indirectly for such conversion.	
Indicator 10.9.1	Verifiers & Guidance:	
The plantation does not occupy land converted from natural forest since November 1994		
	<p><i>Clear felling and replanting of a natural or semi-natural forest with a mixture of native species in the absence of satisfactory natural regeneration is not considered forest conversion to plantation. Clear felling and replanting of a natural or semi-natural forest with an exotic species is considered conversion.</i></p> <p><i>Where the requirements of criteria 10.9 are in conflict with criterion 6.10, the latter will take precedence.</i></p> <p>Interviews with Forest Managers and Government Agencies.</p> <p>Plantations plans and maps.</p>	
Indicator 10.9.2	Verifiers & Guidance:	
If the plantation was converted since November 1994, there is adequate evidence that the current manager/owner was not responsible		
	Legal evidence of ownership or use-right	

APPENDIX A

REGULATIONS AND STANDARDS APPLICABLE IN ZAMBIA

A.	NATIONAL LEGISLATION
	Forestry, Agriculture and Environment:
1.	The Forest Act (CAP 199 of 1973) provides for the establishment and management of National Forests and Local Forests, makes provision for the conservation and protection of forests and trees and the licensing and sale of forest produce. In terms of protection of species, it empowers the Minister to declare any kind or category of trees by statutory instrument, to be a protected tree in the whole or part of Zambia. It prohibits the felling, cutting, burning, injuring, taking or removing of any protected tree.
2.	The Forest Act (No. 7 of 1999). Not actioned yet.
3.	The Forest Regulations, 1976.
4.	The Water Act
5.	Environmental Protection and Pollution Control Act (No. 12 of 1990), Cap 204, provides for the protection of the environment and the control of pollution. It mandates the ECZ to coordinate policies, environmental protection and management of natural resources.
6.	Natural Resources Conservation Act (CAP 315 of 1970).
7.	National Heritage Conservation Commission Act (1989).
8.	Noxious Weeds Act (CAP 343 of 1993).
9.	Wild Life Act (No.12 of 1998).
	Cultural and social:
1.	Town and Country Planning Act (CAP 475 of 1962)
2.	The Minimum Wages and Conditions of Employment Act (No. 2 of 2002).
3.	Industrial & Labor Relations Act (No. 30 of 1997).
4.	Workers Compensation Act (No.10 of 1999).
5.	National Pensions Scheme Act (No.40 of 1996).
6.	Factories Act (CAP 514 of 1967).
7.	Lands Act No. 29 (CAP 287 of 1995). Land in Zambia may be privately owned.
8.	The Memorials Act
9.	Companies Act (No. 26 of 1994).
10.	Zambian National Legislation: Volume 17, i) Public health, ii) Extermination of Mosquitoes
11.	Zambian National Legislation: Volume 18, i) Zambia Revenue Authority, ii) Customs and Excise
B.	REGULATIONS PERTINENT TO FORESTRY RELATED TO AND EMERGING FROM NATIONAL LEGISLATION AND OTHER LEGISLATIVE INSTITUTIONS:
1.	The Conditions of the Forest Concession Licence (separate licence for each concession).
2.	The National Environmental Action Plan (NEAP) of 1994 provides the environmental policy framework for Zambia. It is founded on three fundamental principles - the right of citizens to a clean and healthy environment, local community and private sector participation in natural resource management, and obligatory environmental impact assessments for major development projects in all the sectors.
3.	The Environmental Impact Assessment Regulations, SI No. 28 of 1997 identify some projects that require project briefs such as urban development, transportation, dams, mining, land clearing for large scale agriculture, electrical infrastructure (electricity generation), waste disposal sites, nature

	conservation areas (forests, national parks, GMAs} and introduction of alien species to the local ecosystem.
4.	The National Biodiversity Strategy and Action Plan (NBSAP)
5.	The Water Policy of 1994
6.	The Wetlands Policy was formulated to comply with the requirements of the Ramsar Convention. The overall goal of the Wetlands Policy is to promote the conservation and sustainable use of Zambia's wetlands in order to sustain their ecological and socio-economic functions for the benefit of the present and future well being of the people of Zambia.
7.	One of the key strategies of the Forestry Policy , 1998 is to consolidate the productivity of forest reserves through stakeholders' participation in management, utilization, cost and benefit sharing and protecting forest resources against damage by fires, pests and diseases and against destructive harvesting.
8.	The Wildlife Policy of 1998 expresses ZAWA's commitment to natural resource management and environment protection through, among others, EIAs, resource management planning and effective fire management. ZAWA is further committed to perpetuate native plant life as part of the natural ecosystem. Use of exotic plants in all National Parks is, therefore, prohibited. The policy states that ZAWA will promote the conservation of and take immediate actions to intervene for the protection of all threatened or endangered species of wild flora and fauna. ZAWA considers it necessary to control pests so as to prevent the loss of the host species from the ecosystem, prevent outbreaks of pests from spreading to other plants or animals, conserve threatened, endangered or unique plant species or communities and ensure human safety.
C.	INTERNATIONAL AGREEMENTS PERTINENT TO FORESTRY
1.	<u>Convention on Biological Diversity</u> : The CBD was signed by 150 government leaders at the 1992 Rio Earth Summit and entered into force in December 1993. There are currently 188 Parties to the Agreement. The three objectives of the Convention are: the conservation of biodiversity, the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. The principles of the CDB are broad in scope and unlike CITES, the CBD does not contain detailed provisions on implementation. Accordingly, implementation of the CBD depends on the incorporation of the Convention and associated policies and guidelines into the national legislation of Member States.
2.	<u>Convention on the International Trade in Endangered Species (CITES)</u> : The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was developed in the early 1970's in response to concerns that unregulated international trade in wild species of wild fauna and flora could have a detrimental impact on species and their ecosystems. It currently has 167 State Parties and regulates trade in about 30 000 species. Only a small number of these are actually endangered, the majority being species for which trade measures have been introduced to avoid conservation threat. Parties acceding to CITES agree to place controls on international trade in species that are listed in any of the Convention's three Appendices.
3.	Convention on Wetlands (Ramsar www.cites.org) The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Negotiated through the 1960s by countries and non-governmental organizations that were concerned at the increasing loss and degradation of wetland habitat for migratory water birds, the treaty was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975. It is the only global environmental treaty that deals with a particular ecosystem, and the Convention's member countries cover all geographic regions of the planet.
4.	International Labour Organisation (ILO): with specific reference to <ul style="list-style-type: none"> ▪ Code of Practice on Safety and Health in Forestry ▪ Convention 87: Freedom of Association and Protection of the Right to Organise. ▪ Convention 98: Application of the Principles of the Right to Organise and Bargain Collectively. ▪ Convention 138: Minimum Age for Working ▪ Guidelines for worker's health surveillance ▪ Guidelines for Labour Inspection in Forestry 2005 ▪ Guidelines for Occupational Health and Safety

	<ul style="list-style-type: none"> Protection of Worker's personal data
5.	<p>The International Tropical Timber Agreement (ITTA) was adopted on 26 January 1994 (successor agreement to the ITTA, 1983). There are currently 58 members, comprising 32 producing and 26 consuming members, including the European Community. The agreement is open to any state that produces or consumes tropical timber, and to intergovernmental organizations having responsibilities in respect of the negotiation, conclusion, and application of international agreements. The members represent 90 per cent of world trade in tropical timber and over 75 per cent of the world's tropical forests.</p> <p>The International Tropical Timber Organization (ITTO), established by the ITTA, 1983, administers the provisions and supervises the operation of this Agreement. It has the following mission statement: 'The ITTO facilitates discussion, consultation and international co-operation on issues relating to the international trade and utilization of tropical timber and the sustainable management of its resource base. Among its objectives are to:</p> <ol style="list-style-type: none"> 1. Provide an effective framework for consultation, international co-operation, and policy development among all members with regard to all relevant aspects of the world timber economy; 2. Provide a forum for consultation to promote non-discriminatory timber trade practices; 3. Contribute to the process of sustainable development; 4. Encourage members to support and develop industrial tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interest of local communities dependent on forest resources; and, 5. Encourage members to develop national policies aimed at sustainable utilization and conservation of timber-producing forests and their genetic resources and at maintaining the ecological balance in the regions concerned, in the context of tropical timber trade.
D.	<p>LOCAL STANDARDS AND BEST OPERATING PRACTICES</p> <p>There is very sparse information relating to forestry in Zambia.</p>
1.	"The Forest Resources Management Study for Zambia Teak Forests in South-western Zambia". Final Draft Report January 1996 by the Japan Forest Civil Engineering Consultants Foundation.
2.	Channing, A. 2001. Amphibians of Central and Southern Africa. Protea Bookhouse, Pretoria. In addition to being an identification guide, this book deals with the World Conservation Union (IUCN) red data list categories of amphibians. There is at least one known red data species in Zambia, namely the African Bullfrog (<i>Pyxicephalus adspersus</i>), with numerous others too sparse information.
3.	Golding, J. (ed) 2002. Southern African Plant Red Data Lists. South African Botanical Diversity Network report No 14.
4.	Hilton-Taylor, C. 1996. Red Data list of Southern African Plants. NBI. Strelitzia 4.
5.	Kingdon, J. 1997. The Kingdon Field Guide to African Mammals . Academic press Ltd. This book also deals with the RT&E status of the mammals, and refers to the African Convention Status and the CITES status.

APPENDIX B

LIST OF RARE THREATENED AND ENDANGERED SPECIES LISTED FOR ZAMBIA

The following websites provide information about Zambia's RT&E species:

www.iucnredlist.org (IUCN red lists)

www.panda.org

www.earthsendangered.com (this allows a search per country for species lists)

www.nationsencyclopedia.com (information per country)

www.animalinfo.org (information per country)

www.conservationoutdoors.org (species search per country)

www.nationalredlist.org (email info@nationalredlists.org)

Some of the species are listed in the table below as quoted from www.earthsendangered.com. This list is limited to the "endangered" category, so other rare and threatened species are not included.

	SCIENTIFIC NAME	COMMON NAME	STATUS
A.	FLORA		
1.	See narrative below table		See www.earthsendangered.com
B.	FAUNA (MAMMALS)		
2.	<i>Loxodonta africana</i>	African Elephant	Endangered
3.	<i>Panthera leo</i>	African Lion	Endangered
4.	<i>Phataginus tricuspis</i>	African White-bellied Pangolin	Endangered
5.	<i>Lycaon pictus</i>	African Wild Dog	Endangered
6.	<i>Crocidura ansellorum</i>	Ansell's Shrew	Endangered
7.	<i>Diceros bicornis</i>	Black Rhinoceros	Endangered
8.	<i>Rhynchocyon cirnei</i>	Checkered Sengi	Endangered
9.	<i>Acinonyx jubatus</i>	Cheetah	Endangered
10.	<i>Hippopotamus amphibius</i>	Common Hippopotamus	Endangered
11.	<i>Praomys delectorum</i>	Delectable Soft-furred Mouse	Endangered
12.	<i>Cryptomys kafuensis</i>	Kafue Mole Rat	Endangered
13.	<i>Otomops martiensseni</i>	Large-eared Free-tailed Bat	Endangered
14.	<i>Panthera pardus</i>	Leopard	Endangered
15.	<i>Kobus vardonii</i>	Puku	Endangered
16.	<i>Eidolon helvum</i>	Straw-coloured Fruit Bat	Endangered
17.	<i>Hipposideros vittatus</i>	Striped Roundleaf Bat	Endangered
18.	<i>Ceratotherium simum</i>	White Rhinoceros	Endangered
19.	<i>Cryptomys anelli</i>	Zambian Mole Rat	Endangered

	SCIENTIFIC NAME	COMMON NAME	STATUS
C.	FAUNA (AMPHIBIANS & REPTILES)		
20.	<i>Pyxicephalus adspersus</i>	African Bullfrog	Vulnerable
21.	<i>Mertensophryne nyikae</i>	Nyika Dwarf Toad	Endangered
22.	<i>Crocodylus cataphractus</i>	African Slender-snouted Crocodile	Endangered
D.	FAUNA (BIRDS)		
23.	<i>Rynchops flavirostris</i>	African Skimmer	Endangered
24.	<i>Agapornis nigrigenis</i>	Black-cheeked Lovebird	Endangered
25.	<i>Limosa limosa</i>	Black-tailed Godwit	Endangered
26.	<i>Glareola nordmanni</i>	Black-winged Pratincole	Endangered
27.	<i>Hirundo atrocaerulea</i>	Blue Swallow	Endangered
28.	<i>Gyps coprotheres</i>	Cape Vulture	Endangered
29.	<i>Charadrius pallidus</i>	Chestnut-banded Plover	Endangered
30.	<i>Crex crex</i>	Corncrake	Endangered
31.	<i>Neotis denhami</i>	Denham's Bustard	Endangered
32.	<i>Numenius arquata</i>	Eurasian Curlew	Endangered
33.	<i>Falco peregrinus peregrinus</i>	Eurasian Peregrine Falcon	Endangered
34.	<i>Gallinago media</i>	Great Snipe	Endangered
35.	<i>Aquila clanga</i>	Greater Spotted Eagle	Endangered
36.	<i>Torgos tracheliotos</i>	Lappet-faced Vulture	Endangered
37.	<i>Phoeniconaias minor</i>	Lesser Flamingo	Endangered
38.	<i>Falco naumanni</i>	Lesser Kestrel	Endangered
39.	<i>Agapornis lilianae</i>	Lilian's Lovebird	Endangered
40.	<i>Ardeola idae</i>	Madagascar Pond-heron	Endangered
41.	<i>Ploceus olivaceiceps</i>	Olive-headed Weaver	Endangered
42.	<i>Circus macrourus</i>	Pallid Harrier	Endangered
43.	<i>Chloropeta gracilirostris</i>	Papyrus Yellow Warbler	Endangered
44.	<i>Balaeniceps rex</i>	Shoebill	Endangered
45.	<i>Egretta vinaceigula</i>	Slaty Egret	Endangered
46.	<i>Falco fasciinucha</i>	Taita Falcon	Endangered
47.	<i>Grus carunculatus</i>	Wattled Crane	Endangered
48.	<i>Gyps africanus</i>	White-backed Vulture	Endangered
49.	<i>Trigonoceps occipitalis</i>	White-headed Vulture	Endangered
50.	<i>Lybius chaplini</i>	Zambian Barbet	Endangered
E.	FAUNA (FISH)		
51.	<i>Neolebias lozii</i>	Banded Neolebias	Endangered
52.	<i>Lates mariae</i>	Bigeye Lates	Endangered
53.	<i>Altolamprologus calvus</i>	Congo Blackfin	Endangered
54.	<i>Dinotopterus cunningtoni</i>	Dinotopterus cunningtoni	Endangered

	SCIENTIFIC NAME	COMMON NAME	STATUS
55.	<i>Lates microlepis</i>	Forktail Lates	Endangered
56.	<i>Lepidiolamprologus attenuatus</i>	<i>Lepidiolamprologus attenuatus</i>	Endangered
57.	<i>Neolamprologus christyi</i>	<i>Neolamprologus christyi</i>	Endangered
58.	<i>Oreochromis macrochir</i>	<i>Oreochromis macrochir</i>	Endangered
59.	<i>Oreochromis andersonii</i>	<i>Oreochromis andersonii</i>	Endangered
60.	<i>Oreochromis mossambicus</i>	<i>Oreochromis mossambicus</i>	Endangered
61.	<i>Oreochromis mortimeri</i>	<i>Oreochromis mortimeri</i>	Endangered
62.	<i>Eretmodus cyanostictus</i>	Tanganyika Clown	Endangered
63.	<i>Lates angustifrons</i>	Tanganyika Lates	Endangered
64.	<i>Tropheus duboisi</i>	<i>Tropheus duboisi</i>	Endangered
65.	<i>Xenotilapia burtoni</i>	<i>Xenotilapia burtoni</i>	Endangered

ZAMBIA'S VEGETATION

© Mike Bingham

While it is true that Zambia lacks the spectacular mountains of most of its neighbours, it has more intact miombo woodland than any other country. It also has many large lakes, and vast floodplains. The Zambezi and several of its tributaries are larger than any river to the south of the Zambia. There are more large and spectacular waterfalls than in the whole of the rest of the subcontinent, including five major waterfalls on the Kalungwishi river system alone.

Zambia occupies a central position in the Zambesian Region, which is the summer-rainfall belt of southern tropical Africa. Within the region the natural vegetation is largely determined by altitude, rainfall and soils.

Common names. In countries where the English language has been in use for centuries, such as the United States, South Africa and Australia, many plants are known by common English names. Zambia has a vegetation quite different from those countries and very few species have accepted English names. The tendency to borrow names like "Wild Medlar" is of little help to local Zambians who are never likely to see a medlar, and would not recognise the similarity if they did. Ecologists in this country have preferred to use one of the local names. There is no problem with "mopane" or "baobab", which are established internationally, but there seems little point in coining a whole new system of names when all plants already have names. It is true that some (but not all) of the botanical names are difficult, but for the meantime there is little alternative.

Ecological zones. Zambia can conveniently be divided into the following ecological zones:

- Plateau with higher rainfall
- Plateau with medium rainfall
- Montane
- Kalahari Sand with higher rainfall
- Kalahari Sand with medium rainfall
- Valley

Plateau

Most of Zambia consists of flat plateau at altitudes ranging from about 1000m to 1500m. At this altitude the climate is mild, with maximum temperatures rarely exceeding 35 degrees Celsius. The rainfall decreases from north to south. The 1000mm isohyet corresponds approximately to the boundary separating the four northern provinces from the five southern provinces. This also approximately demarcates an important ecological boundary between the higher-rainfall

miombo and medium-rainfall miombo zones. In the higher rainfall areas the traditional staple crop is cassava (although this is changing) and there is no tradition of keeping cattle. In the medium rainfall areas, the traditional crop is maize (although recent droughts and loss of cattle through disease have forced changes here too) and there is a long tradition of keeping cattle.

MIOMBO WOODLAND. It never fails to come as a surprise to newcomers to the region that many of the woodland trees start their growth cycle in August and September, long before the onset of the rains in November. The flush of new foliage, in spectacular shades of red, is a wonderful sight, and the evening fragrance of the *Brachystegia* flowers three weeks later lends an air of magic after the heat of the day.

Miombo woodlands are generally considered to be deciduous, but they are neither strictly evergreen nor deciduous. They are best regarded as semi-evergreen. Muputu *Brachystegia spiciformis* is evergreen in good years and on the more favourable sites, and deciduous in dry conditions.

The name "miombo" is the plural for "muombo", the Bemba name for *Brachystegia longifolia*, a tree which dominates extensive areas of the Zambesian plateau. Miombo is regarded as woodland, in spite of its closed canopy (with crowns touching), because of its light foliage which allows sufficient light to reach the ground to support a continuous ground cover of grasses and other herbs. Since this herbaceous ground cover dries out and burns most dry seasons, miombo woodland is regarded as a "fire climax", a vegetation type which is maintained by regular fires.

Some woodlands on steep or shallow soils are naturally protected against burning, but retain their woodland structure because of the nature of the soil. Other areas cannot burn because of heavy grazing pressure by cattle. Such areas tend to become heavily invaded by shrubs.

Miombo woodland is defined as any woodland which is dominated by species of three related genera in the family *Leguminosae*: *Brachystegia*, *Julbernardia* and *Isoberlinia*. Unlike most other leguminous plants, these do not develop nitrogen-fixing nodules on their roots.

Two features which these trees have in common are the characteristic mushroom-shaped crown, and that they disperse their seeds by the explosive dehiscence of their pods. The violent twisting of the two valves of the pod flings the seeds to a distance of up to 25 metres.

Miombo woodland is also rich in herbs and subshrubs. Regular burning is necessary for their maintenance. Unburnt dead grass suppresses new growth. Mowing has the same effect as burning, indicating that it is the heat of sunlight on the ground which stimulates new growth. Grazing, however, can be detrimental to the more sensitive herbs, such as orchids and milkweeds, *Asclepiadaceae*. Miombo woodland provides poor grazing except during the rainy months, when the grasses are young. Since this is also the growing season of most other herbs, they are most vulnerable to damage by trampling at that time.

MIOMBO FOREST PRODUCTS. Miombo woodland produces a great range of valuable forest products. The chief source of indigenous hardwood timber is **mukwa**, *Pterocarpus angolensis*, which is logged by pitsawyers in almost every district in the country. Government restrictions on exports have resulted in a serious undervaluation of mukwa which has led to wasteful usage. Another very valuable product of miombo are edible caterpillars, **ifinkobala**, of emperor moths *Saturniidae*, which are harvested in great quantities in certain areas, and sold dried in the urban markets. The foodplant of the most important commercial species is **mutondo**, *Julbernardia paniculata*. This species, which may well be the most common tree of Zambia, is also the most important source of nectar for honey. Unlike the other miombo dominants it flowers after the rains, thus providing a second honey flow. Because there is little else in flower at that time the honey is less contaminated than *Brachystegia* honey. Traditional bark-hive beekeeping has been practised by the Lunda people of Mwinilunga and Kabompo districts for centuries.

HILLS AND ESCARPMENTS. Steep slopes and rocky outcrops are generally protected from fires by the sparseness of the grass cover. The good drainage on slopes ensures that the soil remains friable and free from compaction. These areas are consequently rich in many of the more fire-sensitive plant species. Smooth-barked trees and thicket clumps are characteristic features of the vegetation. Hills of limestone and other basic rock types may develop deciduous thickets, with pockets of rich herbaceous vegetation.

Characteristic of these hill slopes are the smooth-barked species of *Brachystegia* *B. bussei*, *B. glaucescens* and *B. microphylla*, and the white-barked *Sterculia quinqueloba*. Miombo species can only be supported where there is sufficient soil to sustain them. Elsewhere deciduous species predominate.

DRY EVER-GREEN FORESTS. The best quality miombo woodland may grade into dense evergreen forest, especially at dambo margins, or where there are laterite pavements. Like other forest types they are protected from fire by having no flammable ground cover of grasses and herbs. Two of the most characteristic species are **mufinsa**, *Syzygium guineense subspecies afromontanum*, which is frequently dominant, and **mofu** *Entandrophragma delevoiyi*, which occurs as an occasional emergent, and is one of the tallest of Zambia's indigenous trees. Some of the best of these forest, which are seriously threatened by clearing for cultivation, are to be found in the southern parts of Copperbelt Province. The best quality miombo woodland may grade into dense evergreen forest, especially at dambo margins, or where there are laterite pavements. Like other forest types they are protected from fire by having no flammable ground

cover of grasses and herbs. Two of the most characteristic species are **mufinsa**, *Syzygium guineense subspecies afromontanum*, which is frequently dominant, and **mofu** *Entandrophragma delevoiyi*, which occurs as an occasional emergent, and is one of the tallest of Zambia's indigenous trees. Some of the best of these forest, which are seriously threatened by clearing for cultivation, are to be found in the southern parts of Copperbelt Province.

DAMBOS. Owing to the flatness of the terrain drainage on the plateaux is provided by flat-bottomed valleys called dambos. The water level in dambos rises and falls with the seasons. This annual rise and fall in the water level has a number of consequences. Since trees cannot withstand flooding for any length of time the absence of trees marks the highest level to which the water rises. Owing to the flatness of the terrain drainage on the plateaux is provided by flat-bottomed valleys called dambos. The water level in dambos rises and falls with the seasons. This annual rise and fall in the water level has a number of consequences. Since trees cannot withstand flooding for any length of time the absence of trees marks the highest level to which the water rises.

Dambos are features of intense biological activity. It has been observed that elephant prefer to dig for water at the dambo margins rather than taking surface water from the channels. The reason for this is that the water entering the dambo contains minerals, which are adsorbed by clay or taken up by living organisms in their passage through the dambo soil.

Dambos which are permanently wet but have sufficient slope to avoid being flooded, develop into acid peat bogs. These provide habitats for raffia palms, *Raphia farinifera*, orchids and many other interesting plants. Denitrifying bacteria deplete the soils of nitrogen compounds, thus providing habitats for insectivorous plants, such as *Drosera* and *Utricularia*.

Water draining these peat bogs is often black owing to high concentrations of tannins which are leached from the vegetation. Tannins are defensive chemicals which inhibit the digestion of protein by animals. Tannin-producing plants are prevalent in areas of nutrient deficiency, where competition for available nutrients is particularly intense. Black-water rivers are well known to be deficient in animal life.

The grasses and sedges of poorly drained acid dambos are extremely unpalatable to herbivores. However when the soils of these areas are disturbed by heavy trampling, which breaks down the soil structure, palatable grasses may invade. These areas attract grazing animals, thus extending the replacement of sedges by palatable grasses.

Much of the upper and middle course of the Kafue River, upriver of Kafue National Park is flanked by wide dambos, consisting of sedge grassland, whereas in the park the vegetation along the river is mainly short grasses. The latter is kept in a palatable state by grazing and by drainage provided by paths made by hippo to and from the river. Where these animals have been eliminated by hunting the drainage is poor, the soils acid and the vegetation unpalatable.

SWAMP FOREST. Dambos in the higher rainfall area frequently have patches of swamp forest (**mishitu** in Bemba). These, as the name implies, have wet floors. Some are very rich in species while others consist of just one, **musombo** *Syzygium cordatum*. Some of the largest and richest occur in the Mpongwe area of Copperbelt Province. Since the soils cannot be used for cultivation people do not make much use of these forest, and rarely enter them. The dominant musombo does, however, produce fine honey.

FLOODPLAINS. The many extensive floodplains of Zambia have formed where large rivers cross flat plateaux. The Zambezi River and several of its tributaries form a very extensive system of plains in Western Province and the western part of North-western Province. The Kafue River has large floodplains on two of its tributaries, the Lufupa (Busanga Plain) and the Lukanga, in addition to the Kafue Flats. The Chambeshi River enters the Bwela flats near its source, and spills in the vast Bangweulu swamp, which is drained by the Luapula River.

These plains all have rich and distinctive floras. Large areas of floodplain may be inundated for the whole period of the dry season during wet spells, but may not flood at all during dry years. Such areas have two complementary floras, one aquatic and the other adapted to dryland conditions. The aquatic flora consists of a variety of species, such as the wild rice *Oryza longistaminata*, which are rooted in the ground, and have stems which elongate to keep pace with the rising flood, so that the leafy tips are always above water. The water may rise 4 metres or more. As the flood recedes the vegetation lies down to form a dense mat.

Characteristic of the elevated levees and the higher levels of the plains are groves of fan-palms, *Borassus aethiopum* and *Hyphaene petersiana*, the former with a characteristic swelling on the bole. Termite mounds on sandy floodplains frequently have the wild date-palm *Phoenix reclinata*.

TERMITE MOUNDS. Most woodlands and many dambos have large termite mounds, which are frequently covered with dense woody vegetation. As a general rule the plants growing on these mounds are forest species of trees and climbers, but the variety of termite mound vegetation is enormous. What is nearly always apparent is that it is very different from the surrounding vegetation. Yet there are exceptions even to this rule.

There are large tracts of miombo woodland on the plateaux which lack termite mounds. The most extensive areas are the Kalahari Sands, where the soils simply have not enough clay to support stable mounds. In many rocky areas, and

on steep slopes, where the soil depth is limited, mounds are generally absent. Mounds are most consistently found at the dambo margins, where the optimal conditions of drainage and an abundance of suitable clay exist.

Termite mounds undoubtedly have long lifespans, measured in centuries. Old trees associated with mounds suggest this, and archaeological evidence confirms it.

Some species are highly adapted to termite mounds, such as the large succulent tree *Euphorbia ingens*, which superficially resembles some of the New World cacti, but is in fact unrelated. Other trees, notably the Proteas, are never to be found either on or even near termite mounds.

Termite mounds accumulate mineral salts. They are frequently rich in lime even when the surrounding soils are deficient. This accounts for the preponderance of lime tolerating plants on mounds. In some areas mounds are rich in salt, and these attract animals which eat the soil. Even well fed cattle on commercial ranches cannot resist salty termite mounds, eating away the soil to form a grotto and eventually demolishing the whole mound.

Montane Vegetation

Zambia has very little montane vegetation. Four mountains exceed an altitude of 2000 metres: the Nyika Plateau, which is mostly in Malawi, the Mafinga Mountains, also on the Malawi border, Mukutu, an isolated block in Isoka District to the west of the Nyika Plateau, and another isolated peak, Sunzu, south-east of Mbala.

Montane vegetation consists mostly of four types, sub-montane forest, miombo woodland, macchia-type scrub and grassland. The Zambian Nyika has two fine sub-montane forests, Chowo and Manyenjere, and Mukutu also has another. Similar sub-montane forest occurs throughout northern Zambia, notably at the sources of the Zambezi, Lunsemfwa and several other large rivers, and also along the upper escarpments of the Luangwa and Luapula rivers.

High altitude miombo woodland is usually stunted, the trees seldom growing more than about 6 metres high, and often as little as 2 metres. They are thickly encrusted with lichens and epiphytic orchids.

The macchia-type scrub includes many shrubs in the families *Proteaceae*: *Protea* and *Faurea* and *Ericaceae*: *Erica* and *Agauria* and *Compositae* (especially *Helichrysum* spp., the "everlastings").

Montane grassland is much more extensive than forest. It is extremely rich in flowering herbs, which are seen at their best in the months after the rains, March - May. After the fires these areas appear desolate, but without the fires the grassland would turn to scrub, and would lose its herb flora.

Sub-montane areas, at elevations above 1400m, are much more extensive. The flora is less distinctive than the vegetation of the high mountains, but is nevertheless varied and rich. In the vicinity of the Kundalila Falls in Serenje District. More than 360 species of orchids in five different habitats have been recorded (Williamson).

The Kalahari Sands

Although the Kalahari Sand areas of western Zambia are part of the southern African plateau the soils and vegetation are so different from those elsewhere that they are always treated as a distinct entity by ecologists. Kalahari Sand derives its name from the Kalahari Desert, which has undergone considerable expansions many times during its geological history. The Kalahari Sands, which have been described as the largest sand sea in the world, extends from the northern Cape Province, in South Africa, to well north of the equator. They are recognised by microscopic examination of the sand grains, which are rounded and pitted as a result of abrasion while being blown about. In the present Kalahari Desert of Botswana significant dune movement only occurs where the annual rainfall is less than 150mm. The expansions of desert on either side of the equator have depleted the African flora, which is not nearly as rich as South America and other tropical regions.

The main differences between the Kalahari sands and the rest of the Zambian plateaux are attributable to the very deep, free-draining soil with virtually no clay or silt. Such soils provide an excellent growing medium for deep-rooting woody plants. Since it is deficient in clay the soil can only hold nutrients where there is organic matter. Exposure of the soil surface to the sun destroys much of the organic matter and such areas tend to remain bare.

KALAHARI SAND WETLANDS. On the west side of the Zambezi, where the relief is low, there are large plains which barely rise above the high flood level. In Liuwa National Park near the Angolan border there are treeless plains where there is no tree visible above the flat horizon in all directions.

Although the topland areas are deficient in clay and soil nutrients this is not the case with the plains and dambos, which are of great importance for grazing cattle and crop growing. In Sesheke and Senanga Districts the sand overlies old river beds which are rich in clay and lime. These areas can usually be recognised by the presence of termite mounds.

KALAHARI SAND VEGETATION TYPES. There are two types of dryland forest, **mavunda** or *Cryptosepalum* forest, which occurs mainly in the northern higher-rainfall areas, and **mukusi** (*Baikiaea* or Zambezi Teak) forest, which occurs mostly in Sesheke, Senanga and Kalomo Districts, as well as in the adjacent areas of neighbouring countries.

MAVUNDA is classed as a dry-evergreen forest type, consisting of a very dense evergreen shrub matrix, mostly about 4m in height, with a fairly light overwood in which *Cryptosepalum exfoliatum* subspecies *pseudotaxus* (**mukwe**) is the dominant tree. The two main blocks of mavunda, occurring respectively to the north and south of the Kabompo river, constitute the largest area of tropical evergreen forest in Africa (and probably in the world) outside the equatorial zone. Small outliers of mavunda occur as far south as Sesheke District.

MUKUSI FOREST is deciduous and occurs in an area of much lower rainfall than the mavunda forests. Again it consists of a dense thicket with a lighter overwood, but the species are entirely different. The overwood species is mukusi (Zambezi teak), with one or two other species coming into forests of slightly inferior quality. is deciduous and occurs in an area of much lower rainfall than the mavunda forests. Again it consists of a dense thicket with a lighter overwood, but the species are entirely different. The overwood species is mukusi (Zambezi teak), with one or two other species coming into forests of slightly inferior quality.

Zambezi (or Rhodesian) teak supported a major timber industry in the first half of the century, supplying enormous quantities of railway sleepers and parquet flooring. Without this timber resource the rail through to the Copperbelt and Lubumbashi, in Zaire, would undoubtedly have taken much longer to complete. Production of mukusi timber peaked at 100,000 cubic metres per annum in the 1930s and again in 1964. Since then there has been a steady decline, and a recent inventory undertaken by the Japanese aid agency found no further exploitable reserves in the prime teak forest areas of Sesheke District.

As with other indigenous African timbers, exploitation has destroyed the forests, with little hope of recovery. Any opening up of the forest results in the invasion of grasses and fires. Mukusi will survive as a woodland tree, but in this habitat it never achieves the same size as in the forests. The German aid agency has embarked on a 15-year programme to try to find out how to rescue what remains of the teak forests.

KALAHARI WOODLAND, DAMBOS. PANS. Most upland Kalahari sand carries woodland vegetation which is similar to miombo. On the deep sands of the plain east of the Zambezi there are a few major rivers in the form of wide dambos. These are highly productive areas. Also on this plain are numerous "blow-outs", or wind-scoured pans, which are remnants from previous desert conditions. Many are seasonal swamps. These dambos and pans of the Kalahari Sand provide a fine thatch grass, *Loudetia simplex* (**mwange** in Lozi) for which Western Province is famous. Most upland Kalahari sand carries woodland vegetation which is similar to miombo. On the deep sands of the plain east of the Zambezi there are a few major rivers in the form of wide dambos. These are highly productive areas. Also on this plain are numerous "blow-outs", or wind-scoured pans, which are remnants from previous desert conditions. Many are seasonal swamps. These dambos and pans of the Kalahari Sand provide a fine thatch grass, *Loudetia simplex* (**mwange** in Lozi) for which Western Province is famous.

The Bulozo floodplain. This vast area of wetland is one of the most important areas for the production of fish and cattle in southern Africa. The depth of flooding of the Zambezi and its tributaries varies considerably from year to year, which makes both cropping and cattle keeping somewhat dependent on chance. In years of high rainfall the floods recede slowly and the cattle suffer, because the grazing off the plain is of poor quality.

Western Province is the source of some of the finest crafts in southern Africa. The most skilled are the Mbunda and Nkoya people, both of whom use **mukenge**, the root fibres of the tree *Combretum zeyheri* for weaving basket work which is much sought after on international markets. These tribes also make very fine bows and arrows, which are still used in hunting.

The Valleys

Several deep rifts traverse the eastern and southern parts of Zambia, forming the southern end of the great East African rift system. These rifts, or troughs as geologists prefer to call them, vary in depth. The two deepest are the valleys of lake Tanganyika and Malawi, which, with Lake Baikal, are world's deepest lakes.

The valleys of the middle Zambezi and the Luangwa and its tributaries, the Lukusashi and Lunsemfwa, are all approximately 300m in depth. The Kafue Flats form yet another valley trough, although the altitude, about 975m, is only slightly less than the surrounding plateaux, and there are only minor escarpments.

All of these valleys have been formed by down-faulting. The rocks of the valley floors date from the Karroo period. Fossil bones of mammal-like reptiles (Therapsids), which preceded the dinosaurs, have been found in a few places.

Soils derived from the Karroo sandstones generally have a higher mineral content than those derived from the basement complex of the plateaux, and the contrast in the vegetation is sharp. The Luapula valley is not part of the rift valley system and belongs to the basement complex. Its natural vegetation is not miombo, and although it resembles the vegetation of the other valleys in structure, the species are quite different.

Valley vegetation consists of complex mosaics. It is affected by the drainage pattern and soils, and also by large herbivores which are concentrated in these nutrient-rich areas. Deciduous thickets commonly occupy the well drained sites. The banks of rivers and lagoons have riverine fringing forest. The slopes between the thickets and the riverine forest are frequently covered with mopane woodland. Grassy plains occur on cracking clay soils. Lagoons, which are

frequently formed as ox-bow lakes, have a rich variety of aquatic vegetation. At the lower end of the mopane slopes there are frequently large termite mounds covered with forest species. These mounds are often partly or completely encircled by pans, which hold water for several months into the dry season. These pans begin as wallows and are extended as more mud is carried out on animals using them.

MOPANE AND MOPANE WOODLAND. Mopane *Colophospermum mopane* is a very distinctive species familiar to anyone who has visited the Luangwa or Zambezi valleys, where it forms extensive pure stands on the valley floor and lower escarpment slopes. Most people associate mopane with the hot dry valleys, but it also occurs quite extensively on the southern plateau. Its distribution in Zambia is strongly correlated with Karroo sandstone, dating from the Triassic period, which occurs in a number of down-faulted troughs in the much older surrounding basement complex. Mopane *Colophospermum mopane* is a very distinctive species familiar to anyone who has visited the Luangwa or Zambezi valleys, where it forms extensive pure stands on the valley floor and lower escarpment slopes. Most people associate mopane with the hot dry valleys, but it also occurs quite extensively on the southern plateau. Its distribution in Zambia is strongly correlated with Karroo sandstone, dating from the Triassic period, which occurs in a number of down-faulted troughs in the much older surrounding basement complex.

In the drier parts of its distribution range mopane may dominate most soil types, but on the plateau it is confined to particular soil types, which are alkaline and contain high concentrations of sodium salts. The clays in these soils swell on absorbing water, and rapidly become completely impervious.

These conditions are unfavourable to the growth of most trees, and the few species that do tolerate them must be adapted to take up water rapidly for the short time it is available. In fact mopane develops a superficial root system which is able to suppress perennial grasses, and it is not uncommon to observe isolated trees in a circle of taller perennial grass, with only sparse annual grasses and herbs under the trees. This suppression of perennial grasses actually promotes surface runoff and soil erosion, and gulleying is a common feature of mopane woodland areas.

The soil characteristics of mopane woodland are in complete contrast to those of miombo woodland, which conserves both soil and water. Yet mopane can grow on deep, well-drained soils, and many of the finest specimens are on such soils. In these circumstances it develops a deep taproot like its woodland associates. Yet it is evident from its distribution that it cannot compete with *Brachystegia* species and the other miombo dominants.

Besides miombo and mopane there are other woodland types, mostly of minor occurrence. They are generally more open in structure than miombo, and lack the characteristic miombo dominants. They occur in situations which are either too dry for miombo, or become too wet during the rains, or suffer from fires too severe for the miombo species to tolerate.

ANIMAL-MODIFIED VEGETATION. The unnaturally high population densities of herbivores in the more popular national parks have greatly modified the natural vegetation. The constant trampling and browsing of animals effectively prevents any but the best protected species from getting started. Most trees become established as seedlings in dense thickets, which are not attractive to large animals. In fact we often associate elephant, black rhino and buffalo with dense thickets, but this is an artificial situation brought about by hunting with firearms, which has forced these animals to take shelter in the dense forests and thickets. When left in peace these animals they choose more open habitats and avoid the thickets.

Trees such as the baobab, *Cordyla africana*, and several other fruit trees become established in thickets, but once these trees mature and their ripe fruits fall to the ground, elephants and other heavy herbivores attracted to the fruits open up the thicket and transform it into a parkland, which is what we see in many of the best game viewing areas in the Luangwa and Lower Zambezi national parks. Since there is no way that these trees can replace themselves their habitats are not sustainable.

Other fruit trees are able to regenerate without the protection of thickets. These include *Acacia tortilis*, which forms its own spiny thickets, and the two fanpalms, *Borassus aethiopum* and *Hyphaene petersiana*, which has very coarse foliage which resists browsing.

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INDIGENOUS SPECIES OF IMPORTANCE IN ZAMBIA

by A.C Mubita and F. Mwanza

There are some 2 000 woody indigenous species in Zambia and some of these have contributed significantly to the economic development of the country. Since the 1930's *Baikiaea plurijuga* (mukusi) has been used for a variety of uses such as furniture, mining and railway sleepers and parquet flooring. The construction of the national railway line (1902-1906) from Victoria Falls, Livingstone, to the Copperbelt made extensive use of durable mukusi sleepers.

The development of mining on the Copperbelt made extensive use of native timbers for refinery and structural supports. Even today species of *Brachstegia*, *Julbernardia*, *Isobertlinia* and *Marquesia* are extensively used.

Mixed mutondo woodlands are of economic and social importance to the ordinary Zambian and provide fuelwood and charcoal. Some indigenous species produce dyes for leather manufacture whereas others may be of medicinal value.

Silvicultural research

The Teak Forests

There are some eighteen silvicultural investigations being carried out in teak forests some of which started in the 1960's. They are intended to provide basic information about phenology, regeneration and tending methods of mukusi and other timber species of economic importance (Pterocarpus angolensis, P. antunesii, Guibourtia coleosperma, and Entandrophragma caudatum.)

Below is a list of species raised from seed and field tested.

Species	Age (yrs)	Height (M)	DBH (cm)
<u>Afzelia quanzensis</u>	9	2.7	4.1
<u>Albizia adianthifolia</u>	9	5.5	8.2
<u>Baikiaea plurijuga</u>	9	2.3	4.2
<u>Erythrophleum africanum</u>	9	4.7	6.3
<u>Parinari curatellifolia</u>	9	3.9	6.2
<u>Pterocarpus angolensis</u>	9	1.7	4.0
<u>Branchystegia spiciformis</u>	6	1.0	0.6
<u>Uapaca kirkiana</u>	4	1.3	-

In addition, there have been long standing investigations on Pterocarpus angolensis in a number of trial plots at Dambwa and Katombola in Livingstone since 1958.

Following the successful first international conference on the Teak Forests of Southern Africa (18-24 March, 1984 Livingstone) resolutions were passed to treat all problems of teak forest management and conservation as special projects requiring external funding. To this effect a number of project proposals were drawn up by the Forest Department in order to solicit external support from foreign governments.

Other Woodland Timbers

Mixed mutondo woodlands comprise various tree species which are some of the most productive in Zambia. These species provide fuelwood, charcoal and structural timbers for both rural and urban dwellers. Due to intensive exploitation these woodlands are severely exhausted and there is an urgent need to evolve effective regeneration methods and conservation strategies.

Prominent species in these woodlands are:

Anisophyllea pomifera
Brachystegia boehmii
B. bussei
B. floribunda
B. longifolia
B. spiciformis
B. taxifolia
Julbernardia gloiflora
J. paniculata
Marquesia macroura
Parinari curatellifolia
Pericopsis angolensis

Applied research on indigenous tree species was carried out by D. B. Fanshawe for many years and his interest and work resulted in more than 4 000 specimens and collections of references on the flora of Zambia as well as the delineation of some fifty Botanical Reserves.

These investigations on the miombo woodlands are still being pursued and have become some of the most valuable research undertakings in the quest for the scientific understanding of the ecology and silviculture of Savanna woodland tree species at least in Zambia.

The following commercially valuable trees are referred to in the standard:

Latin Name	English common name	Local common name
<i>Baikiaea plurijuga</i>	Zambezi Teak	Mukusi
<i>Pterocarpus angolensis</i>	Wild Teak or Kiaat	Mukwa
<i>Pterocarpus lucens subsp. antunesii</i>	Thorny Teak	Mwangula

End of Standard