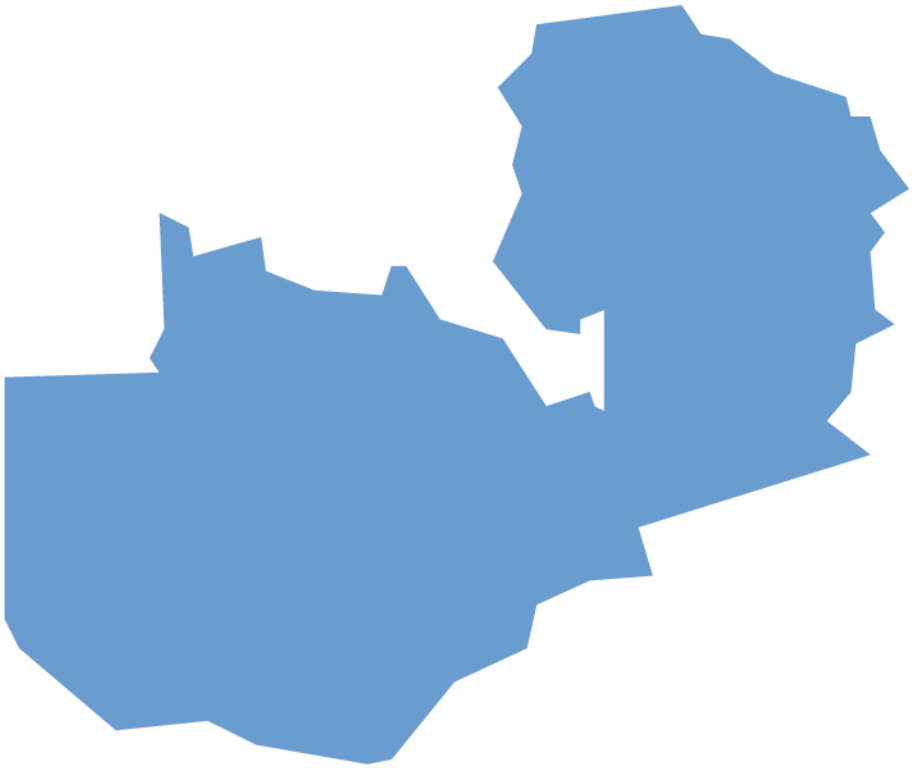
Forest management practices with potential for REDD+ in Zambia

Republic of Zambia
Ministry of Lands,
Natural Resources and
Environmental
Protection



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Forest management practices with potential for REDD+ in Zambia

FINAL REPORT

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EXECUTIVE SUMMARY

1. The Government of the Republic of Zambia is currently assessing the opportunities that REDD+ may provide through different forest and land management practices in Zambia. As one of the fourteen developing countries piloting the UN-REDD programme, Zambia is determined to take advantage of these opportunities. Well-designed REDD+ frameworks are expected to have positive effects on biodiversity, ecosystem conservation and the livelihoods of forest-dependent communities.

2. This study, Forest Management Practices with Potential for REDD+ in Zambia, was commissioned to support the process of preparing the Forestry Department, as well as other institutions and stakeholders, for effective nationwide implementation of the REDD+ mechanism in Zambia.

APPROACH & METHODOLOGY

3. The approach adopted in the study followed a stringent process of setting transparent, academically sound and practical criteria for the selection of the most promising forest and land management practices relevant to REDD+. The systematic process reviewed existing practices and analysed key variables in their performance.

4. The promising forest management practices examined for their potential for REDD+ were: Protected Areas (National Forests, National Parks, Local Forests); pre-independence district forest management plans; commercial plantations, certification of forests, forest products and management systems; Collaborative Forest Management, called Joint Forest Management (JFM) in Zambia; and forest management on land held under customary tenure.

5. The promising land use/management practices examined for their potential for REDD+ were: chitemene (slash-and-burn) agriculture; agroforestry-based agriculture; conventional smallholder agriculture; commercial agriculture; conservation agriculture; beekeeping; and Community-based Natural Resource Management (CBNRM).

6. Practices with a perceived high potential were selected through a comparative analysis that contrasted each individual practice with a set of variables corresponding to the scope of REDD+. The variables were: (i) reduced deforestation, (ii) reduced forest degradation, (iii) sustainable forest management, (iv) conservation of forests, (v) carbon stock enhancement and (vi) the interplay of the practices in the context of UN operational guidelines for REDD+ projects and programmes.

7. Based on the outcome of the comparative analysis, a Sustainable Forest Management (SFM) analytical framework was developed. This SFM framework was used to further prioritize practices that were perceived to have the highest potential for REDD+ implementation in the Zambian context.

8. The SFM criteria and their accompanying definitions/aims were adapted to enhance their relevance to the potential practices for REDD+ within the Zambian socio-economic, ecological and technological context. The interpretation of each criterion was done within the context of the management objective of the respective management practice being assessed.

9. The adapted SFM definitions/aims were categorized in three domains, economic, ecological and social, as follows:

Domain	Criterion	Aim
Economic	Optimization of forest and land resource utilization	To examine the potential value and elasticity/variety of economic goods from the forest and land management practice, and the potential for its contribution to income/ employment of the forest-dependent communities
Ecological	Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles	To examine how forest and land management practices contribute to reduced deforestation, forest degradation and enhancement of carbon stocks
	Forest ecosystem health and vitality	To examine the contribution of the forest and land management practice to the health of the forest ecosystems based on its management objective
	Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	To examine the aspects of biodiversity conservation of the forest and land management practice
	Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)	To examine the contribution of the forest and land management practice in protecting soil and water resources within its locality and the surrounding areas
Social	Maintenance and enhancement of social, cultural and spiritual benefits	To examine the contribution of the category and practices contribution to the social capital of the forest dependent communities
	Adequacy of policy, legal and institutional framework	To examine how the practice fits into the existing policy, institutional and social conditions for it to contribute effectively to SFM

10. Indicator-related questions were developed for the above SFM definitions and aims. Each of the promising six forest management practices and seven land use/management practices were assessed and scored against the indicator questions. The scorings on SFM criteria are presented in Annexes 2 and 3.

11. The study further assessed the promising forest and land management practices against REDD+ criteria, for which another set of indicator-related questions were developed. This provided a means of identifying key constraints and opportunities to REDD+ project/activity development within the context of each practice. The assessment was not scored, as this would have required substantive quantitative data and robust area-specific verified qualitative information outside the scope of the current study.

12. The REDD+ criteria used for the second assessment of the practices (as provided by FAO) were: biomass and carbon levels in the ecosystem; deforestation and degradation threat levels; opportunity costs associated with alternative (to REDD+) land use; clarity of land tenure; governance; probable leakage risk from a REDD+ initiative; likely permanence level; socio-economic and biodiversity co-benefits; replicability (i.e. the potential for scaling up); and compatibility with other livelihood activities.

13. The indicator-related questions to the REDD+ criteria and the assessment against REDD+ criteria are presented in Annexes 4 and 5.

STUDY FINDINGS

14. Main findings from the assessment of forest management practices indicate that the highest rated practices based on their management objectives are (i) forest certification, (ii) JFM and (iii) Protected Area (PA) Systems in National Forests and National Parks.

15. The assessment points to the need for a good mix of practices that emphasize the combination of a partnership approach to forest management (certification and JFM) with a 'fortress conservation' paradigm (PA systems). This

combination is likely to balance out the ever-present difficulties encountered in partnership arrangements for resource management schemes designed to share costs and benefits equitably among partners.

16. Certification and JFM practices were found to have an application beyond the protected Local Forests. Applied in woodlands under customary lands, forest certification and JFM bring on board incentive measures and management planning for SFM. Potential off-farm income generation and employment opportunities under JFM and certification schemes may be boosted by REDD+ incentives, providing enhanced livelihoods and stronger safety nets against deforestation and degradation.

17. The perception of PAs' high potential for REDD+ is corroborated by the literature. It has been observed that the higher the classification rating of a PA (i.e. IUCN categories I and II), the more stringently protected from damaging processes that area is considered to be. Forest biomass and carbon stocks in category I and II PAs are likely to be more stable, and therefore better able to contribute to standing carbon stocks and, if well managed, to carbon sequestration. Regional studies estimate that nearly 69 million tonnes of carbon may be sequestered by forests in class I & II PAs in the Common Market for Eastern and Southern Africa (COMESA), East Africa and Southern African Development Community (SADC) Regional Economic Communities, from a standing stock of nearly 1 644 million tonnes of carbon for the COMESA region. This shows the potential for carbon sequestration under Class I & II PA systems, which cover an estimated 635 9000 hectares in Zambia (World Resource Institute, 2003).

18. The main findings from the assessment of land use and management practices show a ranking of (i) agroforestry, (ii) beekeeping and (iii) CBNRM as the most optimal land use practices for REDD+.

19. Agriculture is one of the key drivers of deforestation in Zambia. Agriculture may benefit from agroforestry technologies that have the potential for increasing soil fertility at low cost. This would reduce the need to open up forested land for cultivation due to declining fertility in cultivated fields. At the same time, agroforestry increases tree cover beyond what is obtained in natural forests.

20. Beekeeping supports income generation in forest communities, but has untapped potential as a tool for SFM. Beekeeping is largely dependent on undisturbed forests. Communities that derive economic benefits from undisturbed forests have been found to be more interested in co-shared protection of the forest. The North-Western Province certification schemes are good examples of the potential of combining beekeeping enterprise with SFM in Zambia.

21. CBNRM is an economic incentive-based natural resource management approach that provides both lessons and building blocks for REDD+ implementation in the Southern African region, and in Zambia in particular. Bond et al, 2009 have articulated the lessons that the REDD+ programmes may learn from and build on. They observe that after 20 years of exploring and implementing CBNRM, stakeholders in the region have developed a substantial body of experience in the field of incentive-led management of communal land and natural resources. Key lessons include: incentive distribution favourable to the communities who bear the opportunity costs for SFM; appropriate partnership models for natural resource management; a substantial degree of autonomy for communities to determine the use of the benefits; and the need for innovative, flexible and locally-adapted implementation of REDD+.

DISCUSSION

22. To make effective use of the forest and land management options, REDD+ will require that wide-ranging technical, policy and institutional considerations are addressed and dealt with at the national and international level.

23. There are technical considerations that must be taken into account. The cornerstone of REDD+ schemes is a reliable, credible system of measuring, reporting and verifying (MRV) changes in carbon stocks. Currently, Zambia has poor capacity for measuring and reporting carbon stocks. A concerted effort is needed to technically synchronize the carbon assessment work done by different actors; put in place a prudent MRV system that can be applied in the context of the proposed practices; and ensure compliance with IPCC guidelines while taking into account the varying combinations of socio-economic and resources in Zambia.

24. Policy aspects also need to be addressed. SFM and REDD+ will require a cross-sectoral approach and a more harmonized policy and legal framework for effective implementation. This may be achieved by adopting integrated land use plans compatible with forest conservation and food security. Forest policy should be harmonized with agricultural policy to ensure permanence.

25. Lessons learned from 20 years of CBNRM demonstrate that benefit sharing and resource tenure are critical to the success of incentive-based national resource management schemes. The review of the current Forest Act should ensure a mutually agreed equitable benefit-sharing mechanism coupled with provisions for tenure arrangements that will give communities the confidence they need to invest their efforts in REDD+ initiatives.

26. Governance has been identified as a critical issue for the effective implementation of REDD+. Pro-poor implementation of REDD+ requires improvements in governance at all levels. However, it would be naïve to wait for threshold levels of governance to be reached before implementing REDD+. REDD+ should be designed to contribute to strengthening governance at all levels, from community-based organizations to the national tiers of government.

27. Institutional considerations also need to be taken into account. Based on the regional CBNRM experience and the lessons learnt from Zambian CBNRM and JFM, we propose a local-level institutional arrangement framework for REDD+ in Zambia based on the following principles:

    - the development of business enterprises focusing on sustainable utilization of forest resources;
    - capacity building through experiential learning and a participatory forest management approach internalized within the Forestry Department;
    - development of robust institutional linkages for collaborative management; and
    - the adoption of sustainability strategy elements.

CONCLUSIONS & RECOMMENDATIONS

28. The SFM analytical framework and the REDD+ criteria assessments developed in this study provide tools for screening the potential of past and present forest management strategies for the implementation of national policy or programme-related REDD+ responses.

29. This study identifies and recommends forest management and land use practices for further consideration. The next step is for the UN-REDD programme to generate a consensus or participatory agreement on the specific forest management strategies and land use practices that will be further tested for REDD+ use in Zambia.

30. One key implementation challenge, within the framework of the proposed forest management strategies, is the scarcity of conclusive and verified bio-physical and socio-economic data that could support a more robust assessment of the potential of the identified forest management and land use practices.

31. A subsequent step would be to subject the assessment of likely sites of high potential forest management and land use regimes to more conclusive bio-physical and socio-economic data related to the SFM and REDD+ criteria.

32. In addition, before developing the REDD+ response strategy, pre-feasibility assessment visits and final full feasibility analysis of likely sites will be needed.

33. There is need to effectively ensure the involvement of local communities in REDD+ implementation to meet SFM and REDD+ objectives and criteria. The CBNRM process has been and continues to be tested in the Zambian wildlife sector. Together with the JFM experience in the forestry sector, they provide valuable lessons that may guide the future planning process for arriving at an effective REDD+ response strategy.

34. Issues of land, resource rights, incentive measures and opportunity costs of alternative land use will be at the center stage of any design of a successful REDD+ initiative at both policy and programmatic levels. The JFM and CBNRM experiences show that as long as the resource rights are vested in the State, the recourse to stimulate people's commitment to collaborative management is an effective incentive system.

35. Incentive measures tested in Zambia in the past, in the wildlife and forestry sectors, show that the issue of benefit sharing between the community and other partners in the collaborative arrangement remains a contentious issue. The controversy may be further exacerbated in the case of REDD+, as carbon is a virtual commodity. Making the communities appreciate and understand the functioning of complex carbon credit markets will be a huge challenge, one that may need the facilitation and brokering by third parties, for example educational non-governmental organizations (NGOs).

36. Agriculture in Zambia is currently based on a pro-poor subsidy policy framework through the Farmer Input Support Programme (FISP). The challenge for REDD+ will be to demonstrate to policy makers that the value of forest management is near or equal to the benefit obtained from agricultural use.

37. On the other hand, agricultural expansion is a major driver of deforestation. Working towards the adoption of technologies and policies that promote agricultural intensification per unit of land area and more permanent agriculture, would greatly contribute to reducing deforestation. This will require concerted efforts to establish strong cross-sectoral collaboration, including the possible harmonization of forestry and agricultural policy and legal frameworks.

38. One of the overarching challenges for UN-REDD in Zambia will be to successfully design and implement a process of participatory domestication of the global REDD+ initiative, maintaining the global objectives and goals, while accommodating and harnessing the local development needs and conditions.

TABLE OF CONTENTS

LIST OF TABLES, FIGURES AND ANNEXES

Tables

Figures

Annexes

ACRONYMS

ADMADE	Administrative Management Design
CBNRM	Community Based Natural Resources Management
CFU	Conservation Farming Unit
CIFOR	Centre for International Forestry Research
COMESA	Common Market for Eastern and Southern Africa
COP	Conference of the Parties
CRB	Community Resource Board
CSO	Civil Society Organisation
DDCC	District Development Coordinating Committee
ENRMMP	Environment and Natural Resources Management Mainstreaming Programme
EPPA	Environmental Protection and Pollution Control Act
FAO	Food and Agriculture Organisation of the United Nations
FLO	Fair Trade Labelling Organisation
FRMP	Forest Resource Management Project
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
GMA	Game Management Area
GRZ	Government of the Republic of Zambia
ILUA	Integrated Land Use Assessment
IPCC	Intergovernmental Panel on Climate Change
JFM	Joint Forestry Management
MRV	Measuring, reporting, verifying
NAPA	National Adaptation Programme of Action
NBSAP	National Biodiversity Strategy and Action Plan

NEAP	National Environmental Action Plan
NHCC	National Heritage Conservation Commission
NJP	National Joint Programme (for REDD+)
NWFP	Non-Wood Forest Products
PA	Protected Area
PAR	Participatory Action Research
PEFC	Programme for the Endorsement of Forest Certification Schemes
PFAP	Provincial Forest Action Plan
PRA	Participatory Rapid Appraisal
PRSP	Poverty Reduction Strategy Paper
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Reducing Emissions from Deforestation and Forest Degradation, Conservation, Enhancement of Carbon Stocks and Sustainable Forest Management
SADC	Southern Africa Development Community
SFM	Sustainable forest management
SNDP	Sixth National Development Plan
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
ZAFFICO	Zambia Forestry and Forest Industries Corporation
ZAWA	Zambia Wildlife Authority
ZEA	Zambia Environment Act
ZFAP	Zambia Forest Action Plan

1. INTRODUCTION

1.1 Background to the study

The Forest Policy and the Zambia Forestry Action Programme of 1998 state that the overall objective of the forestry sector in Zambia is to contribute to the national social and economic sectors both in quantitative and qualitative terms. At the local level, forestry contributes significantly to rural livelihoods and poverty alleviation. Studies (CSO 2007) conducted in the mid-2000s show that forestry-derived industries contribute up to 5.2 percent of the gross domestic product (GDP). This contribution is to be boosted by carbon trade through the provision of financial incentives to reduce greenhouse gas emissions.

REDD+ stands for Reducing Emissions from Deforestation and Forest Degradation (initially referred to simply as REDD), but three other additional aspects are now covered: (i) conservation of indigenous forests, (ii) sustainable management of all forests and (iii) enhancement of forest carbon stocks.

Forests play an important role in the global carbon cycle and contribute to mitigation of climate change through carbon sequestration, carbon substitution and carbon conservation. Protected forest areas enhance the resilience of ecosystems and landscapes to climate change by conserving the soil, protecting watersheds and providing a buffer against natural disasters.

Forest resources in Zambia are under a serious threat from deforestation and degradation. The country is now experiencing deforestation rates estimated in the range of 250 000 ha to 300 000 ha per year (ILUA 2008). Current forest and land management practices play a significant role in this regard. They affect the sector's performance in terms of its contribution to GDP and poverty reduction, as well as its potential for carbon management.

Currently, the most common practices leading to the loss of forest area are:

- the opening of new land for agriculture;
- production of charcoal and harvesting of wood fuel for domestic, commercial and industrial purposes;
- late burning and uncontrolled fires in the dry season;
- uncontrolled logging of timber and over-harvesting of key species;
- unsustainable agricultural methods; and
- other land use practices, such as the expansion of settlements.

A number of factors have contributed to the current state of affairs in the forestry sector. Key problems in the management of the forest sector are the lack of active and full participation of key stakeholders in forest management; the difficulties in implementing policy and legal frameworks that support sustainable forest management; the lack of institutional capacity and coordination in the management of forest resources; land tenure-related issues; and poverty and other socio-economic factors that cause rural populations to rely heavily on forests for subsistence requirements, supplementary income-generation and as a safety net in times of hardship.

In recognition of the role REDD+ can play in reducing emissions and facilitating sustainable socio-economic development, the Government of the Republic of Zambia is assessing the potential opportunities that REDD+ can provide through forest and land management practices that have been used in the past, as well as those currently in use. As one of the fourteen developing countries piloting the UN-REDD Programme, which is aimed at preparing countries for REDD+ implementation, Zambia is determined to seize these opportunities, bearing in mind that well designed REDD+ frameworks should have positive effects on biodiversity and ecosystem conservation, and the livelihoods of forest-dependent communities.

This study will assist in preparing the Forestry Department, as well as other institutions and stakeholders for the effective nationwide implementation of the REDD+ mechanism in Zambia.

1.2 Study approach and methodology

The approach to the assignment was a stringent process of setting transparent, academically sound, and practical criteria for the selection of the most promising forest and land management practices relevant to REDD+. This was done through a systematic process of reviewing existing practices and an analysis of key variables in their performance. The key elements of this process are outlined below.

- A literature review was undertaken to study and analyse the management of forests and land in Zambia, taking into account past and current practices (as specified in the Terms of Reference, see Annex 1); differences in management objectives, managers and tenure arrangements; direct and indirect approaches; and the different management levels.

- Based on the above literature review, a preliminary selection of forest and land management categories, practices and approaches deemed to have the potential to contribute to the REDD+ implementation in the Zambian socio-economic context was carried out.

- The preliminary selection was done by comparing and contrasting each of the reviewed forest and land management practices to a set of variables corresponding to the desired outputs of the REDD+ (reduced deforestation, reduced forest degradation, sustainable forest management, conservation of forests, carbon stock enhancement and the interplay of the practices in the context of UN operational guidelines for REDD+ projects and programmes).

- Based on the outcome of the above comparative analysis, an analytical framework was developed for prioritizing the practices that had the highest potential for REDD+ implementation in the Zambian context.

- Using this analytical framework, an assessment and prioritization of the selected practices with high potential for REDD+ were prepared for consideration by those responsible for implementing the nationally-driven REDD+ process in Zambia.

1.3 Limitations of the study

- Due to the paucity of available literature with quantitative bio-physical information relevant to REDD+ in Zambia, the assessment is more qualitative in nature, with minimal quantitative substantiations.

- The scope and timeframe for the field visits were limited in comparison to the extent of information and variability of the (often undocumented) management practices across the different socio-economic conditions of the country.

1.4 REDD+ conceptualization at international and national levels[1]

International Level

REDD is a new environmental finance concept whose primary objective is to provide financial incentives to reduce greenhouse gas emissions (predominantly carbon dioxide) from forest lands in developing countries. In addition, well-designed REDD frameworks can have a positive effect on the conservation of associated biological diversity and ecosystem services, as well as the livelihoods of forest-dependent communities (including greater income and improved forest governance) through better management of forests.

1 Adapted from the UN REDD+ Zambia National Joint Programme Document 2010.

At the 2009 Climate Change Conference in Copenhagen (COP 15), these concepts were explicitly included in the definition of REDD, which was renamed REDD+. REDD+ differs from REDD in that, in addition to avoiding deforestation and forest degradation, it includes "the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries".

Since the 2007 Climate Change Conference in Bali (UNFCCC COP13), initiatives have been undertaken to support countries preparing for a possible REDD+ mechanism as part of a post-Kyoto international climate change regime. The UN-REDD+ Programme has been developed as a collaborative partnership between the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

Zambia has been selected as one of nine pilot countries to receive initial support ('quick start') to establish a national REDD+ Readiness process through a National Joint Programme (NJP). The aim of UN-REDD+ is to assess whether carefully structured payment structures and capacity support can create incentives to ensure lasting, achievable, reliable and measurable emission reductions while maintaining and improving other ecosystem services that forests provide. The UN-REDD+ Programme can therefore be seen as a decision-support tool to assist the government of Zambia determine whether it will commit to the shifts in uses of forest resource required to participate in a future REDD+ mechanism under the United Nations Framework Convention on Climate Change (UNFCCC). This is termed 'REDD+ Readiness'.

Two key concepts within the REDD+ mechanism are listed below.

- REDD+ is based on performance-based payments; i.e. if the abatement (help or encouragement efforts to reduce emissions) potential is not realized, no REDD+ payments will be forthcoming.
- Addressing deforestation and forest degradation is inherently cross-sectoral and will need to be part of a new nationwide approach to development.

National Level

The NJP for Zambia focuses on preparing Zambia for future REDD+ funding under the UNFCCC and encourages donor participation. This will include developing a National REDD+ Strategy to ensure that Zambia is in a position to access and utilize future REDD+ funding streams.

The NJP will comprise:

- a multi-sectoral approach to reliably assess the drivers of deforestation and forest degradation;
- capacity development to produce and maintain reliable data;
- capacity development to access various REDD+ funding streams for implementation of national REDD+ activities;
- the development of appropriate strategies to reduce deforestation and forest degradation in different regions;
- the consolidation of available information on deforestation and forest degradation.

The 'quick start' UN-REDD+ national programme is not designed to meet the full costs of supporting Zambia through all the phases of REDD+ Readiness. Beyond 'quick start', the Zambian government will be required to meet the following objectives:

- sustainable development to reduce local communities' dependence on wood products;
- strengthening of institutional, policy and legislative frameworks;
- good governance that guarantees transparency in benefit-sharing;

- appropriate nationwide land use planning to facilitate REDD+; and
- effective implementation of natural resource policies concerning forest use and enforcement of legislation across all of Zambia.

The National REDD+ Programme will include tangible learning-by-doing activities in communities and forests. Existing internal funding (the Environment and Natural Resource Management and Mainstreaming Programme - ENRMMP) and external funding (donor) sources will be sought by the NJP to finance these learning-by-doing activities during the 'quick start' phase 1 of UN-REDD+. The institutional arrangements for National REDD+ will be developed during the implementation of the NJP.

2. FOREST AND LAND MANAGEMENT PRACTICES IN ZAMBIA

As not all forms of forest management can be covered, the study carefully selected a sample of practices. In establishing criteria for selection, the study draws upon key elements in Zambia's forest policy, including, the focus on collaboration between government and key stakeholders in the way forests are managed, as in JFM; the emphasis on management plans as the key tools for SFM; the engagement with the private sector in various forms of private-public partnerships as an overall principle for government engagement; and the focus on sustainable use, rather than resource conservation.

In addition to the above, consideration was also given to the desired outputs of the REDD+ process, i.e. reduced deforestation, reduced forest degradation, sustainable forest management, conservation of forests, carbon stock enhancement. The term 'land management practices' in this study do not refer to land management in general, but to practices that include an aspect of forestry or forest management. For example, bark hive beekeeping in woodlands is considered, while solid waste management in peri-urban areas is not.

2.1 Summary description of selected past and existing forest management practices

Protected Areas (PAs) – National Forests and National Parks

A PA is defined as a geographical area that is designated or regulated and managed to achieve specific conservation objectives. Seven types of public-managed PAs are legally recognized in Zambia. This study confined itself to the analysis of the National Forests, Local Forests and National Parks.

National Forests

Forested protected areas are established to conserve water catchment areas and protect biodiversity from damaging processes, such as deforestation, through legal or other effective means. The government, through the Forestry Department, manages these protected forests. Harvesting or other activities are restricted in these forests, unless under special licences authorized by the Forestry Department. The management tools for National Forests are the management plans and licensing of harvesting.

Local Forests

Local Forests are protected forest areas managed to meet the need for forest products for present and future generations of local people and settlements. The institutional arrangement for the management of the Local Forests is the same as for National Forests, where the government is the manager. Harvesting of wood products (e.g. poles, logs, firewood) from the Local Forest is permitted through licences authorized by the Forestry Department. The harvesting of selected commercial non-wood forest products (NWFPs) is also subject to casual licensing by law, but in practice this is not enforced. The management tools for the local forests are the management plans and the licensing system for wood products.

The potential probability for forest degradation is higher in Local Forests than in National Forests because their proximity to local settlements provides free access to NWFPs for a relatively high number of people.

Estimates show that Zambia has quite a substantial area of forested PAs of Class I & II, i.e. areas of high protection levels by international standards. The World Resource Institute, in 2003 estimated that Zambia has 683 Class I & II PAs covering 31 225 000 hectares (Chidumayo, 2009). In both National and Local Forests, the management tools are the respective management plans that prescribe the operational activities to be undertaken by the Forestry Department to ensure their continued resilience and productivity.

National Parks

National Parks are established under the Zambia Wildlife Act for the protection of biodiversity. Harvesting of any products, including wood and NWFPs in addition to wildlife from the National Parks is strictly prohibited. The Zambia Wildlife Authority (ZAWA) manages National Parks on behalf of the government. The management tool for the National Parks is

the park management plans that provide the management prescriptions based on the area and the natural resources that determine the area's carrying capacity.

Game Management Areas (GMAs) surrounding the National Parks are not included in this category. Forest management practices in GMAs are not regulated, though some provisions exist in the legislation for the Community Resource Boards (CRBs) to do so. Current forest use in GMAs is largely the same as on other land under customary tenure (see 2.1.6. below) or managed as part of CBNRM (see 2.2.7. below).

Pre-independence District Forest Management Plans

During the colonial period, the District Forest Offices developed District Forest Management Plans. The plans were made within a broader land use planning framework based on the overall natural resource endowments of the specific district. A natural resources inventory of a respective district was undertaken and the forest area demarcated for use and conservation requirements (e.g. areas for wood provision for the local communities, areas for water conservation, areas for biodiversity conservation, and areas for local agricultural activities). This integrated approach ensured that the ecological, social, economic and conservation needs of the district were well catered for. The government, in collaboration with the traditional authorities, was the manager of these plans, imposing strict legally enforced rules for adherence to the land use prescriptions.

Commercial Plantations

The establishment of commercial plantations in Zambia was driven mainly by the need to supplement the supply of timber from the low yielding indigenous forests and provide timber resources for the mining industry. Commercial plantations generally consist of exotic species such as *Eucalyptus* spp and pine (*Pinus oocarpa* and *Pinus kesiya*).

In the colonial past, the plantations were managed by the Forestry Department. Between the 1960s and the 1990s, the major plantations on the Copperbelt, were managed by the Zambia Forestry and Forest Industries Corporation (ZAFFICO), a para-statal company specifically designated for the purpose. Since the 1990s, the role of the private sector has increased. ZAFFICO has been privatized with the government as the major shareholder. Some plantations are now managed by other private companies as well. The main management tool for plantations is the plantation management plans that prescribe the operations to be undertaken to continuously meet the objective of their establishment.

Certification of Natural and Plantation Forests and Forest Products

At present, three options for certification of forest products exist in Zambia: certification of forests, certification of forest products (commodity certification) and certification of management systems (ISO standards).

Forest certification is a system of voluntary standards and conformance used to demonstrate the practice of SFM. Standards typically require procedures that minimize environmental damage from tree felling and, depending on the species and forest type, limit the amount and nature of trees that may be felled. They can also include obligations to reforest. Standards also outline social and economic requirements that ensure forests are managed in a responsible manner.

Commodity certification is a system of standards and conformance used to demonstrate the clean, safe and fair practice of wild harvesting/producing, processing and handling of a forest product from the forest floor to the consumer. Commodity certification in Zambia is private sector driven. The process of certification is undertaken by internationally recognized certifiers. As certification is costly, initiatives often involve collaboration between local communities, the private sector, NGOs and industry organizations (e.g. The Organic Producers and Processors Association of Zambia - OPPAZ, and the Honey Council). Forest commodities currently under certification include honey, beeswax, wild harvested oils (e.g. mungongo, Schinzophyton rautanenii) and mushroom and wild fruit powder (e.g. baobab). Most producers seek multiple certifications as per consumer preference in that market, such as combining organic and fair Trade. In 2011, the largest producer, Forest Fruits Ltd. of Mwinilunga exported in excess of 500 metric tons of organically certified honey (D. Ball, personal communication).

The third option, certification of management systems (ISO standards) is currently emerging as a tool for the forestry industry sector in Zambia (e.g. Ndola Pine Plantations, Wood Processing Industries). In the future, certification of environmental managements systems (EMS), i.e. the adherence to a protocol of organizational management and control

of environmental impacts of forest operations measured against a management standard, may become increasingly important. ISO 1400I is the prominent environmental standard being utilized (J. Mwitwa, personal communication).

The certification mechanism is a market-based approach that aims to provide the certified forest product with a third party guarantee, which is indicated to the consumer by a label. The economic rationale for certification is that labeling allows the producer to access niche markets where the product, wood and/or NWFP is bought at a higher price than at conventional markets. The higher price pays for the higher management costs.

The management tool for the management of a certified forest is a comprehensive management plan that conforms to the conservation and socio-economic principles and standards developed by stakeholders, including government representation.

There are two globally dominant certification systems for SFM: the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification Schemes (PEFC). At the forest management level, certified forests can be managed by a range of managers, such as the private sector, government, communities or a combination of any of these players.

The management tool for the management of a certified forest commodity is a protocol for the wild harvesting, processing and handling of the product that conforms to clean and safe processing, good practices and other internationally developed product standards. As the EU is the main end market for most certified Zambian products, EU product standards and regulations are prominent. Adherence to the protocol is determined by annual inspections by internationally recognized private-sector certifiers (e.g. EcoCert, UK Soil Association) and other interested organizations (e.g. FLO Fair Trade).

In 2004, Zambia had six forests that were certified under a number of different certifiers. Forest areas as large as 7.5 million ha in the North-Western Province were certified for bee products, honey and beeswax (Njovu, 2004).

Joint Forest Management (JFM)

JFM is an approach that divides management responsibility and returns in designated local forests between government and forest adjacent communities. Key points towards the rationale for formation of JFM include, the subsistence and commercial use of forest products according to management plans; employment opportunities; promotion of technical, organizational and marketing skills; and the contribution to sustainable land use planning. The management tool is a management plan developed in a participatory manner, called the Joint Forest Management Plan that provides the operational and management prescriptions for how the areas are to be managed.

The Statutory Instruments under which the JFM areas were created (SI No. 52 of 1999; and SI No. 47 of 2006) allow for the formation of Community Trusts that establish partnerships with government and other stakeholders (e.g private sector and NGOs) in the management of the JFM area. Currently Joint Forest Management Plans have been developed for seven pilot forest areas that include the Katanino Local Forest in Masaiti District and the Shibuchinga Open Forest (under customary land in Lufwanyama district in the Copperbelt Province). In Luapula Province, management plans were developed for the Lukangaba Local Forest in Mansa District and Mwewa Local Forest in Samfya district. In Southern Province, the declared JFM areas were the Ndondi Local Forest in Choma District, Dambwa Local Forest in Livingstone/Kazangula District and part of Ila National Forest (10 000ha demarcated to be reclassified as a Local Forest) in Namwala District. A draft management plan was also developed for the Myafi Local Forest in Mkushi District, Central Province. The implementation of the JFM plans stalled in the mid-2000s.

Forest management on customary land

The documentation on forest protection and maintenance under traditional forest management regimes in Zambia and East and Southern Africa in general is patchy. There is rich anecdotal evidence of forest management practices upheld by the traditional authorities (e.g. the Litunga of the Lozi, the Citimukulu of the Bemba, and the Mwata Kazembe of the Lunda in Luapula) for regulating the use of important wild harvested products and in the process conserving the forest.

At the household level, people have protected natural woodlots around their homesteads. These woodlots are maintained by thinning out undesirable shrubs and other trees (Chidumayo, 1997b). The scarcity of valuable wood products from

indigenous forests is also forcing some farmers in eastern Zambia to protect re-growth (Chidumayo, 2009) in fallows by regulating wood harvesting (personal observations), protecting valuable species in and around fields and homes, and retaining strips of woodland on fields.

In some cases, management of forests in customary areas by taboo or religious sanctions has ensured the survival of valuable trees and woodland areas. Taboos on cutting fruit trees or trees associated with ancestral spirits are widely referred to in inquiries about why certain species are protected from indiscriminate cutting (personal observation and field visits communication). Among the Tonga of southern Zambia the cutting of trees associated with spirits is strictly prohibited (Olsen 1992; Sorensen 1993). Sacred groves used for male circumcision, rainmaking ceremonies, meeting places for elders, burial grounds, and natural springs have been protected in parts of Zambia. The Muzauli tree species in the Western Province is protected by tradition.

Sorensen (1993) found that controls on the use of scarce forest resources in the customary lands in the Southern Province were aimed at preventing outsiders from exploiting certain tree species, while free access by local people continued unaffected. Often when such controls fail to function, open access regimes emerge and can result in the overexploitation and eventual disappearance of forest resources.

While most of the forests and woodlands in Zambia are found on customary land there is still no systematic or purposeful institutional and management planning for the sustainable use and conservation of forests under customary lands. Can REDD+ prevent the tragedy of the customary lands?

2.2 Summary description of selected past and existing land use / land management practices

Chitemene agriculture

Shifting cultivation may be considered a form of traditional agroforestry. In northern Zambia, the dominant farming system is chitemene, which is practiced in the miombo woodland. Large trees are pollarded or lopped to harvest branches from a large area (out-field) and piled on a small area (in-field) representing about 10 percent of the lopped area (Tuite and Gardiner 1990, quoted in Chidumayo 2009). The wood is burnt to fertilize the cropland. The in-field is grown with a number of food crops (millet, beans, maize and cassava) in well-developed cropping patterns over a cycle of about three years on average and adapted to decreasing soil fertility. The field is then abandoned and left under fallow to allow for the regeneration of the tree stumps.

However, while the chitemene system in the past was well suited to low external input and low labour requirements over the growing cycle, with growing populations this system has been deemed unsustainable. If left unchecked, it can significantly contribute to deforestation. According to Mansfield (1975), increases in population have resulted in reduced fallow periods, which have negative long-term ecological consequences. In the region where the chitemene system is practiced, the growing population has caused deforestation that has resulted in i) the shortening of the fallow period from 25 to 12 years ii) a reduction the woodland requirement per person from 1.1 ha to 0.53 ha and iii) increases in the frequency of clearing for new chitemene gardens from yearly to once in two years (Chidumayo, 1987). In large parts of northern Zambia, traditional chitemene slash and burn has been replaced by other cultivation systems, based on various combinations of burning, composting and fallowing.

Agroforestry-based agriculture

Agroforestry is a land use system in which trees and shrubs are grown or managed in association with crops or animals in the same land unit and provide services and productive functions (Bashir et al. 2006, in Chidumayo 2009). Among the functions of agroforestry practices are the provision of (i) goods such as food, energy and fodder; (ii) regulatory services, such as microclimate modification, erosion control, mitigation against desertification and carbon sequestration; and (iii) supporting services, such as soil fertility improvement and biodiversity conservation.

An example of an agroforesty practice is when improved fallows are established by planting leguminous trees, such as *Sesbania sesban*, *Tephrosia vogellii*, *Crotalaria* spp. and *Cajanus cajan* to speed up the restoration of soil fertility. In

some cases, mixed intercropping with coppicing species, such as *Gliricidia sepium*, *Calliandra calothyrsus* and *Leuceana trichandra*, are used to obviate the replanting of non-coppicing species. Fruit trees are grown around the homesteads for nutrition and income generation. Trees such as *Faidherbia* and *Acacia*[2] spp are grown to improve the pasture for domesticated grazing animals. Another improved agroforestry practice involves the transfer of biomass from trees growing along boundaries or contours on farms to enrich soil fertility on croplands, especially horticultural gardens.

The approach to agroforestry technology development is through Participatory Action Research (PAR), which is a methodology for social mobilization and awareness. It involves socio-political action and research to produce scientific knowledge with and for the people and community groups. It is a process of sensitization; of learning by exposure to concrete village situations; of investigation and the analysis of the realities of village life; of sharing and comparing experiences in the action/reflection process of 'praxis'. Its final aim is to build peoples' power and to enhance quality of life (Kokwe, 2004).

The intended managers of this system are the farmers. The management tool for the system is the process of adaptive management of the agricultural land, including cultivation practices and soil management, to meet household and community felt socio-economic and conservation needs.

Conventional smallholder agriculture (crop and animal husbandry)

There is a variety of smallholder farming systems in Zambia (Schulz 1976). However, there are certain commonalities in the majority of the farming practices in relation to forest conservation. For example, clear felling allows for ease of weeding and fertilizer application, especially on maize fields, and burning of organic matter in land preparation is intended to cut down on the labour requirement for ploughing.

Because of the inherent low productivity of the land in Zambia, farmers manage the decline in fertility after several cropping cycles by opening up of new land under natural or secondary forest. Smallholder animal husbandry in the majority of the animal-based farming systems depends on uncontrolled grazing by animals in natural forests.

The management tool in these systems is also adaptive management by a vast number of smallholders, whose rationale is driven mostly by aversion of risks associated with intensification (i.e. high labour input and external inputs) and adaptation to low yields of crops and animals.

Conventional commercial agriculture (crop and animal husbandry)

Conventional commercial farming practices include the development of a farm field and the application of methods that will maximize the productivity of the land. Large tracts of natural forests land are clear felled (for crops) to meet the market demand for farm products. The clear felling is also necessitated by the need to use farm equipment, such as tractors and harvesters, to make the farming operation efficient.

While some of the commercial farmers engaged in animal husbandry maintain the forests on farmland for grazing, others try to maximize the profits by allowing animals to graze in surrounding forests (personal observation in Ndondi JFM area, 2007). The animals emit greenhouse gases into the atmosphere.

On the other hand, large commercial farms are usually designed and operated to conserve water and forests. Carefully planned land and water conservation measures seek to minimize soil erosion from the farmland. Forest on watersheds and woodlands on less fertile soils are commonly left undisturbed, protected from fire and other forms of intrusion. In aggregate terms, commercial farms conserve significant tracts of forest all over Zambia and they provide an untapped private sector opportunity for REDD+.

Conservation agriculture

Conservation agriculture is a practice that emphasises the limited use of inorganic fertilizers and minimum tillage to conserve moisture and soil fertility. The term 'conservation agriculture' refers to the knowledge-technology package currently being researched, developed and disseminated to smallholder farmers in Zambia by the Conservation Farming Unit (CFU) in close collaboration with the government.

2 In some of the literature, the majority of Acacia species occurring in Zambia have taxonomically been regrouped as Vachellia spp. However, the change in terminology is not yet universally adopted.

Key elements in the approach are zero- or minimum-tillage, spot planting and other techniques that aim at improving soil fertility. In conservation agriculture there is efficient cycling of organic matter from crop residues into the soil, which discourages the burning of organic matter at any one point in the cropping system. Organic fertilizers are used and some of the organic cropping patterns involve the planting of trees (Faidherbia spp.) on the same field as the crops, which constitutes an adapted agroforestry system. However, conservation agriculture technologies currently being promoted in Zambia are quite labour intensive. In the already labour-constrained smallholder households, the per capita land area on which conservation agriculture methods can be applied is quite limited.

Conservation agriculture as a practice, if successful, could contribute significantly to creating permanent agriculture for small scale farmers. Conservation agriculture is a good retainer of soil quality and fertility on land, reducing the need to convert forest and woodland to agricultural use.

Beekeeping

Beekeeping was first recorded in Zambia in 1854 in the form of bark hive beekeeping among the Lunda and Luvale in the North-Western Province (NWP), where there is a long tradition and extensive indigenous knowledge of the industry. The ecological conditions for beekeeping are most favourable in the high rainfall (>1,000 mm/a) miombo woodland, where bees have ample forage and water the whole year, as well as shade and undisturbed forest conditions (Mickels-Kokwe, 2006). There are two main honey seasons in the miombo woodland. The main honey flow occurs in October-December after the flowering of the Brachystegia species. The second, lesser honey flow occurs in May-June, when the Julbernardia species have flowered after the rains. Beekeeping is mostly extensive. Each beekeeper has dozens of bark hives scattered over vast areas of the forest, which he visits maybe only twice in a year (Mickels-Kokwe, 2006).

Between 1964 and 1990, the Beekeeping Division of the Forestry Department promoted beekeeping through extension and purchased honey and beeswax from producers. From 1990, the private sector has played a more important role. During this time a number of private sector community out-grower arrangements have been piloted successfully. The mandate for overseeing and promoting beekeeping lies with the Forestry Department.

The relationship between beekeepers and the woodland is multi-faceted. Beekeepers are dependent on the forest, but their harvesting of bark material for hives from selected tree species causes damage. Under certification schemes (e.g. North-Western Bee Products Ltd, Forest Fruits Ltd) beekeepers commit to a protocol of SFM practices and safe and clean product handling.

Community-based Natural Resources Management (CBNRM)

CBNRM as a concept focuses on four main elements: sustainable use as a conservation paradigm; economic incentives assigned to a resource that enhances the value realized by the community engaged in conservation; devolution of management decisions from government to local institutions; and collective proprietorship (Jones and Murphree, 2001).

The Wildlife Act of 1998 replaced the National Parks and Wildlife Service (NPWS) with ZAWA. Under ZAWA, the Administrative Management Design (ADMADE) programme, which involved revenue sharing, was expanded to include local communities living in GMAs as co-managers through CRBs. This move gave legal backing to communities in wildlife management and thus advanced CBNRM in the wildlife sector.

The management tools for CBNRM are the management plans that stipulate operational rules, such as fire management, allowable harvests and community patrols for guarding against poachers. In the forest sector, CBNRM emerged through the Provincial Forest Action Plan (PFAP), which focused on JFM. Within fisheries, CBNRM has been piloted on Lake Kariba, Lake Mweru and in the Zambezi basin, where fisheries management activities have included forest conservation and woodlots to ensure a sustainable supply of wood fuels for the fish processing industry.

3. ANALYTICAL FRAMEWORK FOR THE ASSESSMENT OF KEY FOREST AND LAND MANAGEMENT PRACTICES FOR REDD+ IN ZAMBIA

3.1 Conceptual and practical justification for the analytical framework

At a conceptual level, payments for REDD+ appear to be a simple and elegant solution to changes in land use that destroy the original vegetation. There are, however, numerous challenges and problems to be overcome in REDD+ implementation. The impetus for developing REDD+ is that forests are being converted to other uses, primarily agriculture, because it makes economic sense to the land managers and users. The solution that is encompassed in REDD+ is that individuals, communities, local and national governments must be rewarded for conserving forests.

Macro-level indicators show that the main countries in the miombo region, including Zambia, are largely poor with small, albeit in some cases, growing economies. The majority of the poor people live in rural areas. Most rural households in miombo ecosystems derive an important but variable proportion of their livelihoods from woodlands. To achieve long-term reductions in deforestation in Zambia, REDD+ will have to be pro-poor, i.e. it will have to explicitly address and build the assets and capability of the poorest households.

The management of these important but diverse woodlands is complex (Bond et al., 2010). Across the region there are challenges and barriers to their more effective and sustainable use. Bio-physically, the soils on which the woodlands grow are inherently infertile, which makes it challenging to manage them for multiple goods and services. The policy environment is made difficult by a disabling forestry policy, the general marginalization of the forestry sector and unfavourable land and resource tenure rights. Finally, decades of low economic growth and political insecurity have pushed people towards rapid exploitation of the woodlands.

The Collaborative Partnership on Forests (CPF) among other groups makes a very clear case, based on global experiences, that SFM provides an effective framework for forest-based climate change mitigation and adaptation (CPF, 2008). SFM provides a flexible, robust, credible and well-tested framework for simultaneously reducing carbon emissions, sequestrating carbon and enhancing adaptation to climate change. At the same time it can help supply environmentally-friendly forest products, protect biodiversity, secure freshwater supplies and provide other essential ecosystem services.

Most forest sector actions that promote carbon conservation and sequestration make good economic, social and ecological sense even in the absence of climate change considerations. Major objectives for managing forests in general include, sustainable forest development; industrial wood and fuel production; traditional forest uses; protection of natural resources; recreation; and rehabilitation of damaged lands. Carbon conserved and sequestered from managing for these objectives will be an added benefit (Brown, 1999). For example, the establishment of plantations, along with offering opportunities for economic development, providing new wood resources, replacing diminishing or less productive natural forests, generating wood exports, substituting for imports, or rehabilitating degraded lands, also are an important means for sequestrating carbon.

In assessing the suitability of the past and existing forest and land use practices we have therefore used an adaptation of the SFM framework (Coillte 1999; Rawat et al 2008) as a basis for developing the criteria for contrasting and comparing the potential of the selected forest and land use practices for REDD+. Coillte defines SFM as follows: "Sustainable forest management is the stewardship and use of forests and forest land in a way and at a rate that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels and does not cause damage to other ecosystems"

3.2 Methodology and Framework

Analytical Framework

As mentioned earlier, this study has used an adapted SFM framework to select and analyse the past and existing forest and land management practices for their potential for REDD+ in the Zambian context. The adaptation in the framework is in the formulation of the criterion (adapted from the Helsinki process) and accompanying definitions and aims to make them relevant for assessing the potentiality of the practices for REDD+ within the Zambian socio-economic, ecological and technological context. The interpretation of each criterion is within the context of the management objective of the respective management practice being assessed.

Table 1 shows the definitions and aims of each of the selected criterion for the analysis. For the purposes of consistency with the SFM framework dimensions, the criteria are categorized in three domains: economic, ecological and social. The questions developed for each criterion are shown in Annexes 2 and 3.

Table 1.
SFM criteria adapted to evaluating forest/land management practices potential for REDD+ in Zambia. Definitions and aims. (Compiled by author)

Economic domain
Criterion 1- Optimization of forest and land resource utilization **Aim**: To examine the potential value and elasticity and variety of economic goods from the forest and land management practice and the potential for its contribution to income and employment of the forest-dependent communities.

Ecological domain
Criterion 2 - Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles. **Aim:** To examine how forest and land management practices contribute to reduced deforestation, forest degradation and enhancement of carbon stocks.
Criterion 3 - Forest ecosystem health and vitality **Aim:** To examine the contribution of the forest and land management practices to the health of the forest ecosystems based on its management objective.
Criterion 4 - Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems. **Aim:** To examine the aspects of biodiversity conservation of the forest and land management practices.
Criterion 5 - Maintenance and appropriate enhancement of protective functions in forest management, especially with regard to soil and water. **Aim:** To examine the contribution of the forest and land management practices in protecting soil and water resources within its locality and the surrounding areas.

Social domain
Criterion 6 - Maintenance and enhancement of social, cultural and spiritual benefits **Aim**: To examine the contribution of the practice to the social capital of the forest dependent communities.
Criterion 7 - Adequacy of policy, legal and institutional framework. **Aim:** To examine how the practice fits into the existing policy, institutional and social conditions for it to contribute effectively to SFM.

The REDD+ Criteria

To further assist the REDD+ preparedness process with a more robust means of assessing the potential of the forest and land management practices and approaches for REDD+, this study assessed the range of the forest and land management practices against REDD+ criteria. This provides a means of identifying key constraints and opportunities to REDD+ project/activity development within the context of each practice. This assessment was not scored, as this would have required substantive quantitative data, and robust area specific verified qualitative information. Scoring would have required further research and field work, well beyond the scope of this study.

Listed below are the REDD+ criteria (as provided by FAO) used for the second assessment of the practices. The indicator-related questions were developed by the author and are shown in Annexes 4 and 5.

- Biomass and carbon levels of the ecosystem
- Deforestation and degradation threat levels
- Opportunity costs associated with alternative(to REDD+) land use
- Clarity of land tenure
- Governance
- Probable leakage risk from a REDD+ initiative
- Likely permanence level
- Socio economic and biodiversity co-benefits
- Replicability (i.e. potential for scaling up to other similar areas)
- Compatibility with other livelihood activities

Methodology

The analytical methodology used to make a preliminary selection of forest and land management practices that are perceived to be of high potential for REDD+ in this report may be summarized as follows:

- The framework uses a set of variables (criteria) against which each of the identified practices is qualitatively assessed in terms of its relevance and effectiveness in relation to meeting the aim of the particular criteria. The definitions of each criterion were developed by the author, drawing on the literature listed in the references. (See Table 1). Each criterion is assigned a set of indicators and questions relevant to assessing the performance of the particular practice relative to that specific criterion. (See Annexes 2 and 3). Please note that the assessment is done within the context of the management objectives of the practice rather than the existing management effectiveness of the practice.

- A six-point rating system was used to gain a nuanced assessment of each identified forest and land management practice against each criterion. A high score (6) indicates a strong positive correlation, and a low score (1) indicates a poor correlation. The value of each score is explained in the tables in Annex 2 and 3. The overall potential performance of each practice is an aggregated score based on an average of the individual scores from all the criterion scores.

- The score rating is based on the assessment of each practice against each criterion based on triangulating information from (a) the literature reviewed; (b) field observations and expert informant interviews conducted during the execution of the assignment; and (c) the analyst's accumulated experience and in-depth understanding of natural resource management in Zambia.

- The scoring in Annexes 2 and 3 was further validated against REDD+ criteria (see 3.2.2.) They are presented in Annexes 4 and 5.

- Based on the scoring, the preliminary list of forest and land management practices perceived to be of high potential for REDD+ were selected.

- The analytical framework was further developed by providing the narrative qualitative information and facts to demonstrate why the selected forest and land management practices and categories have the greatest potential for REDD+.

- The study findings were then contrasted with the current socio-economic and policy situation in Zambia and the fundamental requirements prescribed for REDD+ (REDD+ criteria) to provide further insights with respect to the suitability of the selected forest and land management categories and practices in relation to the REDD+ agenda.

- Based on the above analyses, technical, policy and institutional issues were identified that are pertinent to the successful REDD+ implementation.

- Based on the assessment in this study, and the in-depth analysis of the JFM experiences in Zambia (Kokwe 2007), discussion and recommendations for management structures at the local level for the possible successful implementation of REDD+ in Zambia are provided.

3.3 Findings – what practices have the highest potential?

The comparative analysis yielded a ranking of forest and land use/management practices in their order of potential for REDD+.

The three forest management practices that rated highest based on their management objectives are Forest Certification, JFM and PA systems in National Forests and National Parks.

The main findings from the assessment of land use/land management practices show (in order of ranking) that agroforestry, beekeeping and CBNRM are the most optimal land use practices for REDD+ among the practices assessed.

Tables 2 to 7 below present the key attributes of the three highest ranking forest management and land use/management practices. The attributes combine the findings from the SFM framework and the REDD+ criteria. The detailed assessments from which the key attributes have been drawn, showing the full range of practices analysed, are found in Annexes 2 to 5.

Forest Management Practices with high potential for REDD+

1st Forest Management Practice: Forest Certification

The certification of forest areas scored quite high against most of the SFM criteria because of the inherent requirement in certification for comprehensive principles and management plans. They cover the environmental, economic and social development domains, which are the cornerstone for SFM and sustainable development in general. The following are the corresponding key attributes among others within the certification model that make it a potential entry point for REDD+ based on the SFM framework (see details in Annex 2).

- The requirement for the efficient use of multiple forest products is enshrined in the certification principles just as much as the requirement for the maintenance or enhancement of the long-term economic and social well-being of the forest workers and local communities.

- Principle 6 of the certification scheme requires that forest management under the scheme 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.

- While carbon conservation is not explicitly mentioned in the principles, the fact that the management of the scheme requires aspects ensuring the avoidance of deforestation and forest degradation is evidence that the scheme is implicitly aimed at enhancing forest resources and their contribution to the carbon cycle.

In relation to the REDD+ criteria, the following are the opportunities that the certification model could provide as an entry point for REDD+ project and programme development.

- Threat levels from forest certified schemes are low because their establishment takes into consideration the needs and involvement of the communities adjacent to the certified forest. Under a plantation certified scheme, the threat level is even less due to the additional intensive management and protection regimes used in commercial plantations.

- Certification principles require that the legal and customary rights of indigenous peoples to own, use and manage their territories and resources are recognized and respected. Forest certification principles require the strengthening and diversification of the local economy (wood and non-wood supply) and are capable of supporting continuous employment.

Table 2.
Key Attributes of Forest Certification for REDD+

SFM Criteria	REDD+ Criteria
Optimization of forest resource use	Deforestation, degradation threat level
Ecosystem health and vitality	Clarity of land tenure
Maintenance and enhancement of protective FM functions (notably soil and water)	Governance
Maintenance of socio-economic and cultural conditions	Co-benefits

2nd Forest Management Practice: Joint Forest Management
The following are the key attributes that suggest JFM has high potential as a forest management model entry point for REDD+ based on the SFM criteria.

- In ideal situations, for collective action (as required in JFM) to be worthwhile and sustainable, the benefits arising from collective action should exceed the costs of maintaining community organizations and institutions. One of the principle management objectives of JFM is to provide income to the forest-dependent and surrounding communities.

- JFM areas are managed based on management plans that have been developed in a participatory manner and take into account harvesting and fire control measures.

- The inventory used to make the JFM plan recognizes locally significant biodiversity and provides for its conservation and/or sustainable use.

- The whole premise for promoting JFM is to improve the participation of local communities, including women, in the management of the forest resources, with a view towards the equitable sharing of the benefits arising from joint management. As the process of the development of the management plan is participatory and carried out with the active involvement of the communities, their cultural and spiritual values are taken into consideration.

Based on the REDD+ criteria, the following are the key attributes related to the opportunities that the model could provide for the REDD+ project and programme development.

- JFM areas are managed based on management plans developed in a participatory manner that aim at reducing threats to the declared JFM areas. Hence, ideally the threat levels are likely to be low.

- The premise for promoting JFM is to improve the participation of local communities in the planning and management of the forest resources, with a view towards equitable sharing of the benefits arising from the joint management. As a result the opportunity costs associated with the JFM approach are likely to be low.

- JFM areas were declared in local forests whose tenure is under clear state land status. This makes it easier for the renegotiation of land tenure rights under a REDD+ intervention.

- Although the environmental and forest policy framework supports community participation in natural resource management, the forest legislation still needs to be revised to make legal provisions for this. The forest legislation is at an advanced stage of review to provide for community participation.

Table 3.
Key Attributes of Joint Forest Management (JFM) for REDD+

SFM Criteria	REDD+ Criteria
Optimization of forest resource use	Deforestation, degradation threat level
Forest ecosystem health and vitality	Opportunity costs
Maintenance and enhancement of protective FM functions (notably soil and water)	Clarity of land tenure
Maintenance of socio-economic and cultural conditions	Governance

3rd Forest Management Practice: Protected Areas (PAs)
The following are the key attributes making PAs a high-potential forest management model entry point for REDD+ based on the SFM criteria:

- Harvesting of wood and NWFPs is done by very strict licensing, and hence the areas are assumed to be subjected to minimum anthropogenic induced disturbances. Ideally, controlled early burning and construction of fire breaks are among the management practices applied in national PAs .

- PAs, by their nature and prescribed management objectives, are the least disturbed areas. This is fundamental to increasing the area under natural forests, avoiding emissions and limiting forest disturbance to optimize the carbon sink functions of the forests within the PAs.

- Being the least disturbed areas, PAs may contribute greatly to the protection of a wide variety of species. Their catchment forest area protection function assists in the maintenance and functioning of surrounding wetlands and agro-ecosystems through their role in conserving water and improving soil fertility.

Based on the REDD+ criteria the following are the key attributes related to the opportunities that the National Forest model could provide for the REDD+ project and programme development:

- The land tenure regime governing PAs is clear. PAs are under the jurisdiction of State land, which is solely controlled by the State. This existing clarity could make the renegotiation of the land tenure regime under a REDD+ intervention easier to resolve.

- Water catchment areas protected by PAs contribute to national hydrological services and related economic spin-off activities (e.g. hydropower generation, irrigation, fisheries). If payments for these services are equitably shared with the forest-dependent communities, PAs have the potential to provide substantial socio-economic co-benefits.

- With effective forest legislation enforcement, adherence to licensing regimes and the implementation of

established management plans, PAs may remain relatively undisturbed or maintain their conservation status, which can contribute to slowing down deforestation and forest degradation.

- PAs are compatible with other forest-dependent community economic livelihood activities. They contribute to water and soil conservation and nutrient recycling functions that are critical to farming, the main livelihood activity of the majority of Zambia's forest-dependent communities.

Table 4.
Key Attributes of Protected Areas (PAs) for REDD+

SFM Criteria	REDD+ Criteria
Ecosystem health and vitality	Clarity of land tenure
Maintenance and enhancement of forest resources and contribution to global carbon cycles	Permanence
Maintenance and enhancement of protective FM functions (notably soil and water)	Co- benefits
Maintenance, conservation and enhancement of biological diversity	Compatibility with other livelihood activities

Land Use / Management Practices with high potential for REDD+

1st Land use/Land Management Practice: Agroforestry
Listed below are the key attributes making the agroforestry-based agricultural practice a high potential land use model entry point for REDD+ based on the SFM criteria.

- Improved agroforestry systems provide a wide range of products (e.g. grains, fruits, vegetables and fodder) that are beneficial for both household food security and income generation. The practice provides for informal on-farm self employment for communities in rural areas.

- Improved agroforestry systems comprise of a range of technologies (e.g. improved fallows and alley cropping with nitrogen fixing plants) that improve the agro-ecosystem and support cost-effective permanent agriculture. A higher degree of permanence in cultivation results in reduced demand for conversion of natural forests into agricultural land, which maintains and enhances carbon cycles.

- By combining agricultural crops with trees in the same area, agroforesty contributes to increasing tree and vegetative cover on farms, and improving carbon stocking and sequestration.

- Soil fertility maintenance and improvement, and soil and water conservation are the key premises of agroforestry technologies. By enhancing soil quality, the water retention capacities of the edaphic system are improved, which in turn contributes to the increase in the percolation of water into underground water reserves. Farm trees also assist in nutrient recycling of leached soil nutrients.

Based on the REDD+ criteria the following are the key attributes related to the opportunities that agroforestry practices could provide for the REDD+ project/programme development:

- Agroforestry is a people-based technology that benefits smallholders, communities and the environment. Support services include the government agricultural research and extension services and NGOs that are eligible under REDD+. This is an institutional opportunity for setting up good governance structure and procedures for a REDD+ initiative.

- The multiple benefits of agroforestry technologies in farming dominated livelihood systems are likely to reduce their opportunity costs to alternative use.

- The replicability of agroforestry technologies is very high under varying ecological and socio-economic conditions around the country.

- Agroforestry systems support a wide range of crops and animal products that are beneficial for both household food security and income generation. By contributing to the reduction in the clearing of natural forests for agricultural expansion, the practice indirectly contributes to the conservation of the forest biodiversity. At the farm level, the practice increases biodiversity in the agro-ecosystem.

Table 5.
Key Attributes of Agroforestry for REDD+

SFM Criteria	REDD+ Criteria
Optimization of land resource utilization	Compatibility with other livelihood activities
Forest ecosystem health and vitality	Co-benefits
Maintenance and enhancement of forest resources and contribution to global carbon cycles	Replicability
Maintenance and enhancement of protective FM functions (notably soil and water)	Governance
Maintenance and enhancement of forest resources and their contribution to global carbon cycles	Opportunity costs

2nd Land use/Management Practice: Woodland Beekeeping
The following are the key attributes that make the practice of woodland beekeeping a high potential land use model entry point for REDD+ based on the SFM criteria:

- Beekeeping has high productivity, excellent returns to labour time, and provides a range of products (e.g. honey, beeswax and propolis) that are of high value with good market demand. The practice is capable of providing direct income and self-employment to communities.

- Beekeeping is dependent on the conservation of forest and water resources, as well as the control of fires, for the bees to thrive and be productive. SFM is a prerequisite for sustained beekeeping.

- If SFM is the prerequisite for sustained beekeeping, it follows that woodland beekeeping can make a great contribution to the avoidance of forest degradation and deforestation, thereby indirectly contributing to carbon stock and carbon sequestration.

- The majority of beekeepers are rural dwellers, and beekeeping provides a social safety net for these people. Most of the knowledge used in beekeeping is derived from indigenous knowledge. Traditional honey beer used in ceremonies in the North-Western Province is an example of the contribution that beekeeping contributes to maintaining cultural and spiritual values.

Based on the REDD+ criteria the following are the key attributes related to the opportunities that woodland beekeeping practice could provide for the REDD+ project and programme development:

- Beekeeping is dependent on the conservation of forest and water resources for the bees to thrive and be productive. The harvesting of bark for use in hives may offset some of the overall positive contribution of beekeeping. However, alternative methods to bark hives have been tested in Zambia and may be improved upon under a REDD+ initiative.

Table 6.
Key Attributes of woodland beekeeping for REDD+

SFM Criteria	REDD+ Criteria
Optimization of land resource utilization – HIGH	Deforestation, degradation threat level – LOW
Forest ecosystem health and vitality - HIGH	Replicability - MEDIUM
Maintenance and enhancement of protective FM functions (notably soil and water) - MEDIUM	Co-benefits - HIGH
Maintenance of socio-economic and cultural conditions - HIGH	Compatibility with other livelihood activities - HIGH
Maintenance and enhancement of forest resources and contribution to global carbon cycles - MEDIUM	

- Beekeeping may be replicated in areas with similar bio-physical conditions.
- Beekeeping increases the range of products that the forest-dependent communities can use for subsistence and income generation (e.g. sales of honey and beeswax, brewing of honey beer). In addition to contributing to reduced forest degradation and deforestation, the bees provide an ecosystem service through their important role in pollination, which helps to maintain and enhance productivity and biodiversity in the forest systems.
- Through trading and processing, beekeeping may enhance and sustain a secondary industry and provide additional livelihood options.

3rd Land use/Management Practice: Community Based Natural Resource Management (CBNRM)
The following are the key attributes that make CBNRM a high potential land use approach an entry point for REDD+ based on the SFM criteria:

- The economic logic for CBNRM is that the net benefits from community management of common resources outweigh the transaction costs of collective action. CBNRM is therefore concerned with resources that need to be managed collectively and have sufficient value to make this collective action worthwhile. This is true for wildlife resources in Zambia and can be true for forestry. There is variety of different available species that can be promoted for both consumptive and non-consumptive activities. In the wildlife sector, the practice provides direct employment to local communities.
- CBNRM evolved and is practiced around the principle of community (men and women) participation in natural resource management and the sharing of the benefits accruing from protected resources. The collective responsibility builds social capital in the communities, extending and increasing cooperation and reciprocity in socio-cultural affairs.
- Minimal disturbance of the forests in the GMAs greatly contributes to reduced forest degradation and significantly limits the rate of deforestation. The semi-protected area status of the GMAs enables them to maintain the forest area, thereby helping to increase the aggregate extent of forest and tree cover.
- The maintenance of viable populations and communities of both animal and plant species contributes to the maintenance of soil and water conservation.
- The relatively undisturbed forests in GMAs enhance the availability of NWFPs for household use and income generation. The processing and trading of NWFPs provide a further option for livelihoods.

Table 7.
Key attributes of CBNRM for REDD+

SFM Criteria	REDD+ Criteria
Optimization of land resource utilization	Deforestation degradation threat level
Maintenance and enhancement of protective FM functions (notably soil and water)	Governance
Maintenance of socio-economic and cultural conditions	Replicability
Maintenance and enhancement of forest resources and contribution to global carbon cycles	Co-benefits
	Compatibility with other livelihood activities

Based on the REDD+ criteria the following are the key attributes related to the opportunities that CBNRM could provide for the REDD+ project and programme development:

- The management plans for the GMAs clearly oblige the managers to manage the areas with minimum disturbance of the natural resources, both wildlife and vegetation. Fire management is a core function.
- CBNRM has evolved and is practiced around the principle of community (men and women) participation in natural resource management and the sharing of the benefits accruing from the protected resources. ZAWA manages the GMAs in collaboration with the communities, both eligible under REDD+. The legal provisions for the implementation of CBNRM are in place and drive the sustainable management of wildlife in Zambia.
- Increased income and or community services are gained by the community through their participation in natural resource management. The first principle for the establishment of GMAs is to create a buffer around the National Parks to help in the conservation of plant and animal biodiversity. The maintenance of viable populations and communities of both animal and plant species contributes to the maintenance of soil and water conservation.

3.4 Discussion on the prioritized optimal practices for REDD+ in the Zambian context

The main findings from the above assessment are:

(i) The three forest management practices that rated highest based on their management objectives are forest certification, JFM and PA systems in National Forests and National Parks.

(ii) The assessment seems to point to the need for a good mix of practices that emphasize a combination of partnership approaches to forest management (certification and JFM) and a 'fortress conservation' paradigm (PA systems). This combination is likely to balance out the ever-present difficulties encountered in partnership arrangements in managing resources intended for equitable sharing of benefits among the partners.

(iii) Certification and JFM practices can be designed to expand their focus and application beyond the local forests to forests under customary lands, bringing on board its inherent incentive measures and management planning for SFM. Most of forest areas in Zambia fall under customary land tenure. The key drivers of deforestation are rooted in anthropogenic actions, such as agriculture and fuel wood needs, while the key underlying cause is poverty. The potential off-farm income generation and employment opportunities from JFM and certification schemes, especially if boosted by the REDD+ incentives, would provide a safety net against deforestation and forest degradation while providing improved livelihoods to local people.

(iv) In general, PAs with higher IUCN classification (I and II) can be considered to be more stringently protected from damaging processes than lower category PAs. Because of this, forest biomass and carbon stocks in PAs of category I and II are likely to be

more stable, and therefore contribute more to standing carbon stocks and, if well managed, to carbon sequestration. An approach for the estimation of the the carbon stock in the PA systems in the COMESA, East Africa and SADC region (quoted in Chidumayo 2009) estimated that nearly 69 million tonnes of carbon can be sequestered by forests in class I & II PAs in the COMESA, East Africa and SADC Regional Economic Communities from a standing stock of nearly 1644 million tonnes of carbon for the COMESA region. This shows the potential of the carbon sequestration under Class I & II PA systems, which in Zambia cover an estimated 635 9000 hectares (World Resource Institute, 2003).

(v) In ranking order, the assessment of land use and management practices shows agroforestry, beekeeping and CBNRM as being the most optimal land use practices for REDD+ among the practices assessed. As one of the key drivers of deforestation, agriculture would benefit from the agroforestry technologies that could potentially increase soil fertility at low cost and at the same time increase forest and tree cover beyond natural forests.

(vi) The potential of agroforestry for carbon sequestration is indicated by a number of studies in the COMESA region. The potential for agroforestry in the COMESA, East Africa and SADC countries is high even in densely populated countries. In Malawi, for example, where land holdings per household ranges from 0.5 to 3 ha, the total land under agroforestry is reported to be 45 percent to 85 percent. Wood production in agroforestry systems can reach about 2.1 tonnes (equivalent to 1.0 tonnes of carbon) per ha per year (Bunderson et al. 1997). Average farm sizes in western Kenya range from 0.6 ha to 1.4 ha, but can store 6.5 to 12.4 tonnes of carbon per farm, with trees representing the most important aboveground carbon pool (Henry et al. 2009).

Using climatic, edaphic and topographic factors, Conchedda et al. (2001) estimated that land suitable for agroforestry was 26-52 percent in Ethiopia, 32-80 percent in Kenya and 19-54 percent in Uganda. Median carbon storage estimates in agroforestry globally has been estimated at 9 tonnes per ha in semi-arid eco-zones; 21 tonnes per ha in sub-humid eco-zones; and 50 tonnes per ha in humid eco-zones. When these storage values are applied to agricultural lands, estimates can be made of the potential of improved agroforestry practices in carbon storage and sequestration. Such studies would be useful in the Zambian situation to provide evidence of the potential benefits in carbon storage under an extensive agroforestry-based agricultural system. Studies done for the COMESA, East Africa show that there is a huge potential for improved agroforestry practices to contribute to carbon storage and sequestration within the COMESA, East Africa and SADC regional economic communities.

(vii) Beekeeping supports household income generation in forest areas, but holds an untapped potential as a tool for forest management. As stated earlier, beekeeping is dependent on undisturbed forests, and if communities derive appreciable economic benefits it is most likely that the desired protection of the forest can be co-shared with communities. The North-Western Province certification schemes (North-Western Bee Products, Forest Fruits Ltd.) are good examples of the potential of combining beekeeping enterprise with sustainable forest management. Experiences from the field have demonstrated even better designs for optimizing the beekeeping industry to contribute to forest management while providing income to communities and partners. Furthermore, the forest range in which viable beekeeping in Zambia is being practiced is quite varied, ranging from Eastern, to Central and North-Western Provinces.

(viii) CBNRM as an economic incentive-based natural resource management approach (noting that REDD+ is also an incentive mechanism for reducing emissions) provides both lessons and building blocks for REDD+ implantation in the Southern African region and Zambia in particular. Bond et al, 2010 have articulated the lessons that the REDD+ programmes can learn from and indeed build upon, noting that, after more than 20 years of exploring and implementing CBNRM, stakeholders in the region have developed a substantial body of experience in the field of incentive-led management of communal land and natural resources. Due to the similarity between proposed REDD+ approaches and CBNRM, they have identified a number of implementation lessons including:

- The incentives for the management of natural resources and financial benefits must accrue directly to farmers who bear the opportunity and implementation costs of REDD+ projects.
- The implementation of REDD+ should build on the partnership models between government, communities and NGOs that have evolved under CBNRM.
- Benefiting communities must be allowed a high degree of autonomy in how financial benefits are used and shared.
- The implementation of REDD+ should be innovative and flexible and adapted to local circumstances.

4. DISCUSSION ON REDD+ IMPLEMENTATION ASPECTS

For REDD+ to make effective use of the forest and land management options proposed in this paper, wide-ranging technical, policy and institutional considerations will need to be addressed and dealt with at higher levels (national and international) than the forest management level.

4.1 Technical aspects

A cornerstone of any national REDD+ scheme is a reliable, credible system of measuring, reporting and verifying (MRV) changes in carbon stocks. Zambia has poor capacity for measuring and reporting carbon stocks. Zambia now has the opportunity to establish an MRV system through the support from the NJP and the Integrated Land Use Assessment (ILUA) II. A concerted effort is required to have the two programmes technically synchronize the sequence of their activities. For example, if the REDD+ programme agrees on using the forest and land use practices proposed in this study, it would be prudent that the MRV system put in place is one that can be applied in the context of the proposed practices.

The ILUA I report used land use classes based more on the forest type approach in presenting its data on a number of forest-related variables, including carbon stocks. A case in point is the land use class used in the ILUA I report to present the existing carbon stocks. The report presented land use by vegetation type rather than the conventional established land use categories, such as protected areas, forests on customary lands and areas under chitemene agriculture. It is possible that the data in the database for the ILUA I can be queried to produce information on the conventional established practices. Nevertheless, the lesson from this example is that it will be critical that the capacity building and choice of variables to be computed by the MRV system are in accordance with the broader approach that the REDD+ programme will use in implementing the REDD+ activities. The MRV system should respond to the reality of the national REDD+ implementation approach rather than retrofitting REDD+ into an MRV system. This situation is compounded further by the obligation to comply with IPCC guidelines and whether those guidelines take into account the varying combinations of socio-economic and natural resources in different countries for making REDD+ relevant to local socio-economic circumstances.

In terms of the proposed options of the practices, PAs, by virtue of the fact they have been set aside for the long-term maintenance of natural habitats, offer substantial advantages over other land management systems in terms of baseline, land ownership and permanence. The certification and JFM options also offer good possibilities for the establishment of baselines as their management is very much dependent on a comprehensive inventory of the existing resources in well-demarcated zones.

4.2 Policy aspects

SFM in general, and REDD+ in the Zambian context, will require a cross-sectoral approach and a more harmonized policy and legal framework for effective implementation. Forest policy should be harmonized with agricultural policy to ensure permanence. For example, currently maize monocropping is substantially subsidized at the expense of other REDD+ compatible agricultural cropping systems, such as agroforestry systems. The implication is that if agroforestry is to be used as a pathway through which the REDD+ activities are to be implemented, equitable incentives, such as those provided for maize monocropping, should also be available for agroforestry systems. Considering the additional income that can be accrued by farmers practising agroforestry from the REDD+ incentive mechanism, a good case can be made for government to promote agroforestry as a key agricultural practice in terms of the economic and environmental benefits it provides. The existing resources under the NJP can better be used for initiatives to influence policy as early as possible, notwithstanding the comprehensive communication component to be developed under the REDD+ strategy.

The forest sector should take advantage of the Environmental Management Bill that requires all sectors to develop environmental strategies. The forest sector should engage with the other key development sectors, especially those

sectors that have a significant negative impact on forest management (e.g. agriculture and energy) to ensure that the environmental strategies of these sectors are as compatible with REDD+ as possible.

Lessons learned from the 20 years of CBNRM demonstrate that benefit sharing and resource tenure are critical to the success of incentive based natural resource management schemes. The review of the current Forest Act should ensure a mutually agreed equitable benefit-sharing mechanism coupled with provisions for tenure arrangements that will make the communities confident enough to invest their efforts into REDD+ initiatives. The provisions in the revised Act on benefit sharing and resource tenure rights and arrangements are the key assumptions (or killer assumptions) for the successful implementation of the REDD+ initiatives in Zambia.

4.3 Institutional arrangements for local level implementation of REDD+

The analysis of governance within CBNRM has tended to focus on identifying the appropriate scale for wildlife management and then matching the rights and responsibilities necessary for effective management (see Child, 2009). CBNRM experience has shown that community organizations that are accountable to the electorate are more effective as resource managers and coordinators of development activities (Child, 2009; Dalal-Clayton and Child, 2003). Accountability and transparency are enhanced through participation in public processes, such as annual general meetings, the election of community representatives and public revenue distribution (Child, 2006).

Governance at all levels has been identified as a critical issue for the effective implementation of REDD+ (Cotula and Mayers, 2009; Bond et al., 2010). Pro-poor implementation of REDD+ in the miombo region should require improvements in governance at all levels. However, it would be naïve to wait for threshold levels of governance to be reached before implementation takes place. REDD+ should be informed and contribute to improved governance from community-based organization to the upper tiers of government.

Based on the above regional CBNRM experiences and the lessons learned from the Zambian CBNRM and JFM local institutional arrangements, the following institutional arrangement framework is proposed for REDD+ in Zambia.

Overall guiding principles / elements

Development of business enterprises focusing on sustainable utilization of forest resources
The REDD+ programme should facilitate the development of a REDD+ model based on an enterprise approach and a business-oriented legally recognized institutional entity, through which the public and private sector roles are coordinated and enhanced. This would develop business enterprises focusing on sustainable utilization of renewable forest and land resources. This should be complemented by the facilitation of market access, value addition and micro-financing for the natural resource products being utilized. The aim is to create significant and equitable economic and social benefits for the communities and their respective partners.

Capacity building through experiential learning and participatory forest management approach internalization within the Forestry Department
REDD+ as a programme should reinforce its assistance to the communities in the development of appropriate, scientifically valid, socially acceptable sustainable forest resource and land use management systems to alleviate human-induced pressure on resources. This strategy aims at addressing gaps in the knowledge and technology base, a constraint identified in analyses of the relationship between poverty and sustainable forest resource conservation. It stresses the importance of on-site planning and development of appropriate management regimes. This should ensure that knowledge is being generated together with the intended users. This makes accessibility to knowledge and technology easier and more effective than when technologies are developed elsewhere and imposed on users. Furthermore, building a community-based cadre of people in technology development would alleviate the shortage of extension personnel.

To effectively realize the above strategy, the Forestry Department, as the primary facilitating agent of the REDD+ model, needs to undertake an institutional transformation process in building the capacity of its staff. Participatory forest practices and MRV should be internalized in both the formal training, research and extension system of the Forestry Department

across the board and not only restricted to geographical areas where REDD+ while be initially implemented.

Development of robust institutional linkages for collaborative management
The REDD+ programme's institutional structure should reinforce its intricate connection to mainstream government structures (Forestry Department, District Councils and the District Development Coordinating Committee or DDCC) for decentralized planning and facilitation of development activities at the district level. This should further ensure the district-level ownership of the programme. At the community level, the programme should equally be facilitated by and through legally constituted structures for forest resource management and enterprise development. These should be designed to run on a business model to secure community responsibility for SFM and the development of sustainable financing mechanisms to support the enterprises after donor support to the programme ends.

Sustainability strategy elements
The sustainability strategy of the REDD+ programme should be secured through four main elements. The first element is the intricate connection of the programme's institutional structures at both district and community levels to legally mandated and recognized mainstream structures for development planning. The proposed central enterprise structure for the community (Community Trust) should be based on sound business principles and practices. Secondly, there is a need for the development of innovative financing mechanisms to secure a financial base beyond the carbon-based funding from external sources. Thirdly, the programme needs to support activities that are economically viable and are supported by a forest and land resource base that has comparative advantage of being able to supply the raw materials for the identified enterprises. Fourthly, the programme should adhere to management plans that encourage and support sustainable use practices, while at the same time promote enterprise development.

Institutional strategic elements

Community/Partners definition
The interested communities and partners should define themselves based on their comparative advantages in relation to the activities to be undertaken. A community may be composed of a group of villages or larger geographical areas, depending on the economies of scale to make the activity profitable.

Boundary definitions
On customary lands, the community and partners should negotiate with their neighbours the limits of the forestlands that they wish to manage. This should be the forest limits covered by their license or lease. For gazetted forests they should negotiate these limits with the Forestry Department and the private sector. Traditional boundaries that existed before the gazetting of such forests should be given favourable consideration in the definition of these boundaries.

Rights of access and exclusion
The community and partners should have exclusive rights to the forest within their concession and develop negotiated and popularized rights of exclusion endorsed by the Forestry Department or traditional authority, depending on the forest category to be managed.

Equity and benefit sharing
The community should develop an agreed upon plan for equitable sharing of the costs and benefits of forest management. All forest community-user groups and socio-economic groups should be represented in the Community Trust.

Environmental considerations
The community should develop, with the assistance of the Forestry Department, a management plan with provisions for the integration of biodiversity conservation, fire management, wildlife management, range management, watershed management, as deemed appropriate and in accordance with local conditions and opportunities.

Key structures and their roles
The key institutions involved are the Forestry Department, district councils, proposed community trusts, area management committees and user groups. Their key characteristics and roles are as follows:

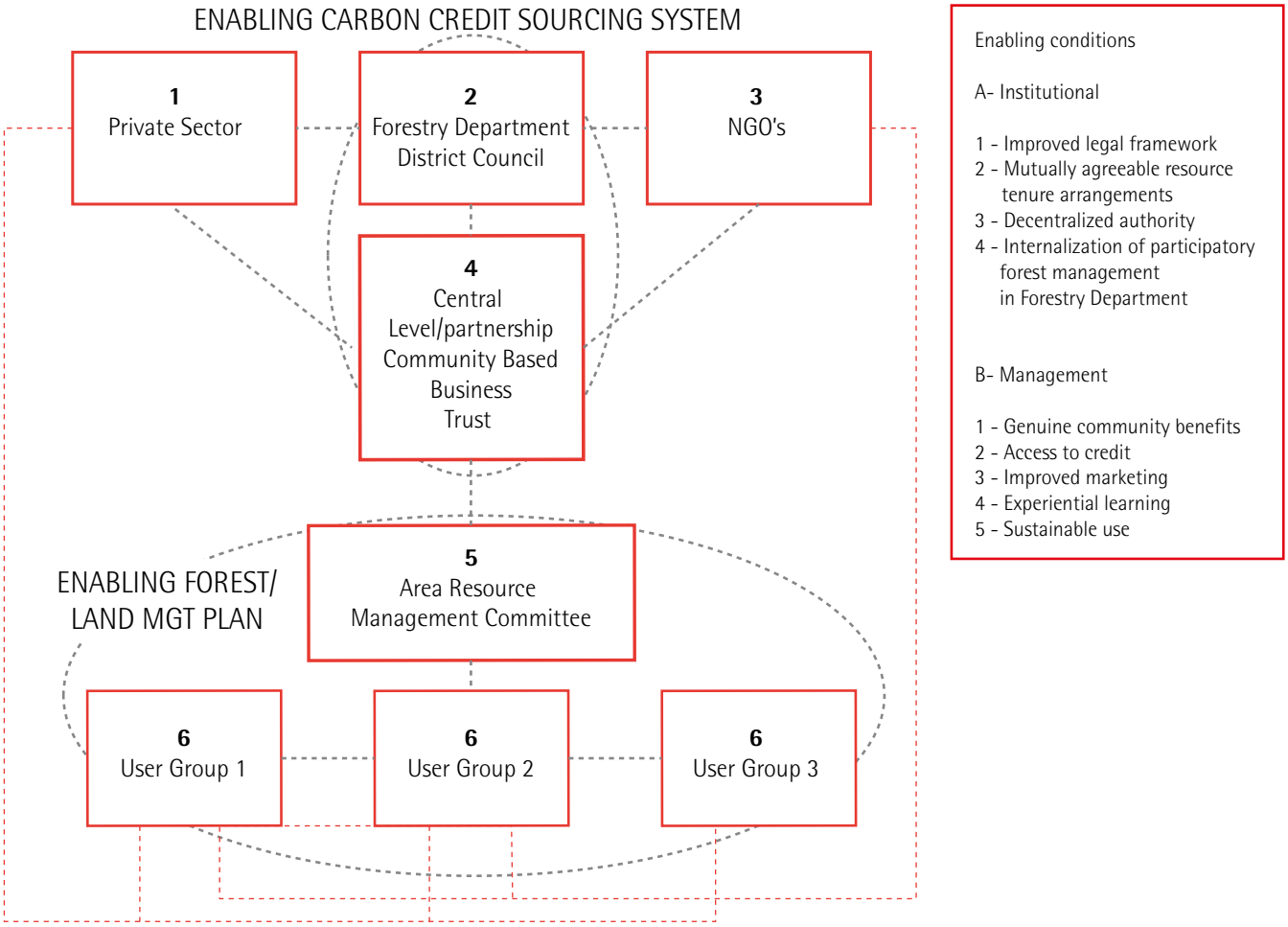
(a) The Forestry Department / District councils

The Forestry Department at the district level and the District Council should interact in supporting the REDD+ model through the already established DDCC and the DDCC sub-committee on natural resources.

Roles

- Facilitating the provision of technical assistance in the development and training of partners in the implementation of forest and/or land management plans, including forest resource assessments, inventories and the economic valuation of the forest or land resources in the designated forests.
- Monitoring and evaluation of community and partners adherence to the biodiversity and ecological conservation-related provisions of the management plan.
- Approval of the management plan.
- Creation of a REDD+ fund to support the Forestry Department's recurrent costs for providing technical assistance for REDD+ development in existing REDD+ areas and replication in other areas.
- Facilitate the incorporation of the REDD+ model plans and their local rules into the district and national development plans and legal instruments.

Figure 1.
Proposed Community Enterprise Based Forest and Land Management Framework
(modified from Kokwe 2007)



(b) The Community Trust (Central Business Association)

The community/partners trust should be a business membership body, legally registered as a business entity under Zambian laws, of the user groups at the REDD+ area level. It would provide business management oversight and coordination for the promotion of the user group's forest or land-based enterprises based on sustainable utilization of the forest and or land resources. The executive functions of the Community Trust can be carried out through a lean executive body or supported by an NGO. The Community Trust should have representation from the traditional authority in the chiefdom, the Forestry Department and the District Council as *ex-officio* members.

Roles:

- Coordination of the Area Resource Management Committee activities and facilitation of the development of business management plans.
- Monitoring the enterprises being undertaken in the REDD+ model.
- Marketing and identifying market linkages and, where possible, develop a central marketing and processing centre for the user groups.
- Facilitating benefit sharing within the Community Trust and to traditional leadership.
- Screening and quality assurance of community enterprise and forest management proposals to potential funding sources.
- Liaison and negotiation functions and information provision for, and on behalf of, the membership with external service providers (including required capacity building of the membership), policy makers, joint venture partners and other relevant stakeholders.
- Establishment of a district level REDD+ forum for all stakeholders.
- Provide oversight for financial and asset management of the Community/Partner Trust.
- Conflict resolution between area management committees, where more than one area management committee exists for the enterprise.
- Representation of the Community/Partner Trust on the DDCC.

Reporting

The Community/Partner Trust reports and is accountable to its membership assembly.

(c) Area Resource Management Committees

The Area Management Committee should be a user group's representative body at in the geographic area covered by REDD+, with representation of the traditional authority.

- Roles:
- Community mobilization for forest management plan implementation.
- Monitoring of the user groups' forest and or land management operations.
- Through the user groups, development of mechanisms for managing externalities affecting the REDD+.
- Facilitating the formulation of local rules and enforcement measures in a participatory manner.

- Collection of dues accruing to the Community Trust from REDD+ activities.

- Conflict resolution in the community in the REDD+ area.

Reporting
Each Area Management Committee reports and is accountable to the Forest Department for the implementation of the forestry management plan; to the Community Trust for the dues collected; and to the traditional authority for conflict management.

(d) User Groups
User groups are members of the community who enter into an internal arrangement for organizing access to, the use and management of, and control over a particular resource.

Roles:

- Implementation of the approved forest and land management and business plans within their designated REDD+ operational areas.

- Reporting and demonstrating progress of planned activities to the Area Management Committee.

- Developing benefit-sharing mechanisms for income accruing to them from their business ventures.

- Monitoring the Area Resource Management Committee and Community Trust financial and democratic principles accountability.

- Choose the members of the Area Management Committee and Community Trust.

Reporting:
The user groups report and are accountable to the Area Resources Management Committee on forest management-related provisions and obligations of the management plan; and to the Community Trust on enterprise-related provisions of the business plans.

5. CONCLUSIONS AND RECOMMENDATIONS

The SFM analytical framework and the REDD+ criteria assessments carried out in this study provide a means of screening the potential for using past and existing forest management strategies for the implementation of national policies or programmes related to REDD+ responses.

Based on their management objectives, the analytical framework assessment has identified and rated Forest Certification, JFM and PAs Systems in the terms of the category of National Forests and National Parks as having the highest potential for REDD+ in Zambia.

In terms of past and existing land use practices and approaches, agroforestry-based agriculture, beekeeping and CBNRM have high potential for REDD+ in Zambia based on their land use objectives.

Some of the challenges identified (based on the REDD+ criteria) related to REDD+ implementation within the framework of these forest management strategies, include the scarcity of conclusive and verified biophysical and socio-economic data that can support a more robust assessment of the potential of the identified forest management and land use practices identified through this study.

Once a participatory agreement is reached on which forest management strategies and land use practices and approaches could be used for the REDD+, the next recommended step is to undertake a similar analysis, informed by more conclusive biophysical and socio-economic data related to the SFM and REDD+ criteria, of likely sites for each high potential forest management and land use regimes. The third step would be to make pre-feasibility assessment visits, which would be followed by a full feasibility analysis before developing the REDD+ response strategy.

There is an urgent need for information and data management that can easily be used for planning and assessments related to REDD+. Any future assessments for planning and assessing the feasibility of the desired REDD+ initiatives should be supported by the most recent verified data and information to allow for evidence-based decision making.

Based on this preliminary assessment using the SFM and REDD+ criteria proposed in this study, the majority of forest management and land use practices highlighted as having the potential for REDD+ will involve the participation of the communities for their implementation. Based on this pro-poor dimension, the CBNRM process, which has been tested in the Forestry sector through JFM and continues to be tested in the wildlife sector, provides some valuable lessons that could guide the future planning process for an effective REDD+ response strategy.

- Issues of land and resource rights and incentive measures, and compensation for the opportunity costs that may arise by implementing the REDD+ responses will play a central role in the success of the design of any REDD+ initiative at both policy and programmatic levels. The JFM and CBNRM experience shows that, as long as the resource rights are vested in the State, stimulating people's commitment to collaborative management is an incentive system that works. However, with the decentralization euphoria in the country, REDD+ should position itself for the likelihood of resource tenure reverting to the traditional authorities and individual community households. On incentive measures, in both wildlife and forestry collaborative arrangements tested in Zambia, the issue of benefit sharing between the community and the other partners in the collaboration remains a contentious issue. This will be further exacerbated in the case of REDD+ as carbon is a virtual commodity, and making the communities understand the complex markets surrounding the conditions for gaining or not gaining credits will be a huge challenge.

- Agriculture in Zambia is currently based on a heavily subsidized policy framework. The challenge for REDD+ will be to convince the policy makers to put a value on forest management that is near or equal to agriculture. On the other hand, it is evident that agricultural expansion is a major driver of deforestation, and working towards technologies and policies that promote permanent agriculture would greatly contribute to reduced deforestation. This entails the need for concerted efforts to engage in strong cross-sectoral collaboration, including, if possible, the harmonization of the forestry and agricultural policy and legal frameworks.

- One of the overarching challenges will be how the REDD+, a global initiative, will accommodate local development needs and conditions.

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ANNEXES

ANNEX 1. Revised Terms of Reference

The key purpose of this consulting assignment, a study on Forest management Practices with Potential for REDD+ in Zambia, was four-fold. In accordance with the Letter of Agreement, p. 1, and the approved Inception Report, pp 5-6, the study was tasked to:

1) Review and describe forest and land management practices:

- Identify, review, analyse, and provide concise descriptions of past and current forest management practices under different legal and institutional set-ups; (LoA 2.a) ii, iii)
- Identify, review, analyse and provide concise descriptions of selected land management practices in agriculture and under community based natural resource management; (LoA 2.a) v)
- Identify key national, provincial, district and community level institutions responsible for forest and selected land management practices; (LoA 2.a) ix)

2) Assess and prioritise the forest and land management practices for their potential for REDD+

- Assess and prioritise past and current forest management practices in relation to their potential and suitability for REDD+ (LoA 2.a) iii, iv and vi);
- Assess and prioritise selected land management practices in relation to their potential and suitability for REDD+ (LoA 2.a) v);

3) Based on the above, develop an analytical framework that will clearly demonstrate which forest and land management practices have the greatest potential and suitability for REDD+, in combination with promoting sustainable forest management, combating deforestation and combating forest degradation; (LoA 2.a) vii)

4) Contrast the study findings to the current situation in Zambia, and provide recommendations for optimally suitable forests management categories, approaches and management structures at local level for the successful implementation of REDD+ in Zambia; (LoA 2.a) viii).

ANNEX 2.
Detailed analysis of forest management categories and practices against adapted SFM criteria

1. Protected forest areas: National Forests and National Parks			
Assessment criteria	Indicator related questions	Assessment	Score1
1.1 Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities? • What is the practice's contribution to GDP?	National Forests and Parks, being protected areas, usually contain a variety of valuable products with substantial economic value and market demand. While the intensity of management is different between National Forests and Parks, the common denominator is the minimum disturbance of the vegetation existing in the two protected area regimes. The primary management objective of National Forests and Parks is for the protection of ecologically sensitive areas (e.g. catchment forests). In National Parks, harvesting of any product is strictly forbidden and strictly controlled. In National Forests therefore, the PAs do not lend themselves to providing consistent direct income and employment to the surrounding communities. However, when one considers the role catchment forests play in driving the economy of the country through their contribution to river flows (to generate hydropower) and soil fertility (nutrient recycling), National Forests contribute greatly to the national economy. The income accrued to GDP through tourism in the National Parks s is also quite substantial.	5
1.2 Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Harvesting of wood and NWFPs is done through very strict licensing in the National Forests. Hence the areas are supposed to be subjected to minimum anthropogenic disturbances. Ideally, controlled early burning and the construction of fire breaks are included among the management practices applied in national reserves.	6
1.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	National Forests reserves by their nature and prescribed management objectives are fundamental to the increase in area under natural forests and in emission avoidance and sequestration of carbon. Limited forest disturbances optimize the carbon sink functions of the forest.	6
1.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	Being the least disturbed forests, National Forests can contribute greatly to the protection of a wide variety of species. Their catchment function assists in the maintenance and functioning of surrounding wetlands and agro-ecosystems by conserving water and improving soil fertility.	5

1. Protected forest areas: National Forests and National Parks			
Assessment criteria	Indicator related questions	Assessment	Score
1.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	National Forests primarily protect watershed areas, which contribute significantly to the maintenance and enhancement of environmental flows. Undisturbed vegetation cover also contributes significantly to controlling soil erosion while the litter and the soil nutrient cycling characteristics of the vegetation contributes to soil fertility.	6
1.6 Maintenance and enhancement of social, cultural and spiritual benefits.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	National Forests and Parks are public service dominated with no degree of people's participation in their management. This is justified given that the practices are for nature conservation and the enhancement of the natural ecological processes necessary for the resilience of the ecosystems. Human interference is a key factor in the disturbance of the ecological functions in the ecosystem. Therefore restricting individuals from disturbing these natural systems is justifiable if ecosystem resilience, so vital in the mitigation and adaptation to climate change, is to be realized.	3
1.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice? • What is the level of investment in research and development?	The policy and legal framework in support of the existence and establishment of the forest reserves is in place. However the enforcement of the provisions is inadequate. The existing institutional framework, which is public sector dominated, is inadequate in terms of human resources capacity; levels of investment in research and development; and the availability of information to promote the practice.	4
Average Score	Satisfactory		5

1 Scoring: 5.5-6 = highly satisfactory (very high positive correlation); 4.6-5.4 = satisfactory; 3.6-4.5 = moderately satisfactory; 2.6-3.5 = moderately unsatisfactory; 1.6-2.5 = unsatisfactory; 0-0.5 = highly unsatisfactory (negative correlation).

2. Protected forest areas: Local Forests			
Assessment criteria	Indicator related questions	Assessment	Score
2.1 Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The management objective of the Local Forests is for conserving and securing highly controlled supplies of timber. The products in the local forests are diverse with good market demand. The practice does render itself to the provision of income and employment to surrounding communities.	5
2.2 Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Harvesting of wood and NWFPs is done by licensing in the Local Forest. Hence the areas are supposed to be subjected to planned anthropogenic disturbances. Ideally, controlled early burning and construction of fire breaks are among the management practices applied in the Local Forests.	5
2.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	Local Forests, by their nature and prescribed management objectives, are supposed to have controlled and planned disturbances. They are fundamental to increasing the area under National Forests, as well as for avoiding in emissions and sequestering carbon.	5
2.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	Local Forests contribute to the protection of a wide variety of species under controlled harvesting prescriptions. Their conservation protection function assists in the maintenance and functioning of wetlands and agro-ecosystems through their role in conserving water, controlling soil erosion control and recycling nutrients.	5

2. Protected forest areas: Local Forests			
Assessment criteria	Indicator related questions	Assessment	Score
2.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	The conservation function of Local Forest assists in the maintenance and functioning of the forest system. The tree stand conserved over time in Local Forest plays an important role in water conservation by improving rain water percolation into the edaphic and underground water aquifers. In addition, trees and vegetation in the forest provides soil cover that helps to slow down soil erosion and contributes to soil fertility through soil nutrient recycling and above ground litter decomposition.	5
2.6 Maintenance and enhancement of social, cultural and spiritual benefits.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	People's participation in the management of Local Forests is limited to the adherence of the prescriptions of licensed activities. Furthermore, the harvesting of NWFPs is not restricted in the Local Forests, as is the case is for the National Forests. Therefore a certain level of benefits are shared by the communities, especially women who are the major collectors of NWFPs for household use and income generation. The practice provides the social safety net for the majority of the rural households.	5
2.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The policy and legal framework in support of the existence and establishment of Local Forests is in place. However, the enforcement of the provisions is inadequate. The existing institutional framework at national level is inadequate in terms of the human resource capacity; levels of investment in research and development; and the availability information to promote the practice. However, in areas where Local Forests have been declared as JFM areas, the development of local institutional frameworks for community involvement in the management of the forest has shown the potential for cost-effective monitoring and evaluation, information status and dissemination.	5
Average Score	Satisfactory		5

3. Pre independence District Forest Management Plans			
Assessment criteria	Indicator related questions	Assessment	Score
3.1 Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The management objective of the district forest management plans in the pre-independence era were based on a land use planning framework that took into account the needs for conservation of ecological services, the supply of forest goods to local communities and local food security under a strict regulatory system. The level of market demand of the products depended on the forest products in the district. The practice did render itself to the provision of income and employment to surrounding communities.	5
3.2 Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Harvesting of wood and NWFPs was highly controlled. Hence the areas were supposed to be subjected to controlled and planned anthropogenic disturbances. Among the management practices that were applied in the Local Forests were controlled early burning and construction of fire breaks. The low population pressure also could have accounted for the minimal amount of unsustainable forest exploitation.	6
3.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	Demarcated forest management units were controlled and planned and were fundamental to increasing the area under Natural Forests, as well as avoiding emissions and sequestering carbon.	5
3.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	Units with diverse or of local biodiversity significance were protected to maintain and enhance a wide variety of both plant and animal species. Their conservation protection function assisted in the maintenance and functioning of surrounding ecosystems, such as wetlands and agro-ecosystems, by conserving water, controlling soil erosion and recycling nutrients.	6

3. Pre independence District Forest Management Plans			
Assessment criteria	Indicator related questions	Assessment	Score
3.5 Maintenance and appropriate enhancement of protective functons in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Demarcated forest conservation units assisted in the maintenance and functioning of wetlands and agro-ecosystem by conserving water, controlling soil erosion and recycling nutrients.	6
3.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	The practice was highly a top-down approach but was sanctioned and legitimized by the traditional authorities who were given authority to monitor the adherence to the provisions of the management plans in their areas of jurisdiction. Traditional spiritual sites were equally recognized and protected under the management plans. However people's participation in the management was limited to their obligations to follow the rules enshrined in the management of the plans.	2
3.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The policy and legal framework in support of the district forest management plans was in place and was augmented by adequate human resource, investment in research and development, and the availability of information. .	4
Average score	**Satisfactory**		**4.9**

4. Conventional Commercial Plantations			
Assessment criteria	Indicator related questions	Assessment	Score
4.1 Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	Management objectives for commercial plantations in Zambia are primarily for the production of valuable timber to meet market (industrial and local) demands. The practice does render itself to providing employment and income generation to surrounding communities and beyond.	4
4.2 Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Commercial plantations are subjected to intensive silvicultural practices, such as controlled burning, harvesting and the successive rotations of trees. However, sometimes the plantations can harbour weeds and pests harmful to the surrounding natural forests and agricultural lands. It is also possible for plantations to use chemicals in some silvicultural practices that may be harmful to the environment. Plantations can provide an array of economic benefits. They also complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.	4
4.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	Commercial plantations contribute to the carbon conservation as they constitute an important stock of carbon and source of carbon sequestration in addition to the Natural Forests. Commercial plantations also contribute to carbon substitution through the transfer of forest biomass into products that can replace fossil fuel-based energy sources and products and cement-based products. Maintenance of optimum stocking levels is also conducive to carbon sequestration.	5
4.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	Commercial plantations are not known to play a direct significant role in enhancing local biodiversity, especially since they are predominantly based on the establishment of fast growing exotic species. Furthermore, plantations replacing intact natural forests will have a negative impact on biodiversity. In some instances invasive exotic species can be detrimental to the natural forests around plantations. However, recent studies elsewhere show the possibility of plantations being able to increase local biodiversity through the re-establishment of native species in their understory. In addition, when one considers that plantations may relieve the wood pressure on Natural Forests, this may contribute to the conservation of biodiversity, especially at the ecosystem level.	3

4. Conventional Commercial Plantations			
Assessment criteria	Indicator related questions	Assessment	Score
4.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Debate on the negative impact of certain exotic species on the natural hydrology systems is still inconclusive. However, the standing plantations do play a role in regulating soil erosion and improving ground water retention in forest ecosystems.	4
4.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	People's participation in plantations is limited to the provision of labour rather than decision making. This labour is not restricted to any gender as a matter of official policy of most commercial plantations. It is a practice dominated by intensive formal silvicultural science. Commercial plantations are run as businesses and therefore people's participation cannot be a mandatory requirement. Depending on the history of the sites and whether a dysfunctional regulatory framework (corruption) is in place, just as in the establishment of settlements, plantations can displace people or infringe on the spiritual and cultural activities of resident communities.	3
4.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The legal framework for the establishment of plantations is adequate in Zambia. At the institutional level, the establishment of plantations provides a viable avenue for Public Private Partnerships (eligible under REDD+) to obtain multiple economic gains from wood products and carbon conservation initiatives.	5
Average Score	Moderately satisfactory		4

5. Certification of forest, forest products and forest management

Assessment criteria	Indicator related questions	Assessment	Score
5.1 Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	One of the driving forces behind the past forest certification schemes was to increase the value of the products under the certified forests. The requirement for the efficient use of multiple forest products is enshrined in the certification principles, as is the requirement for the maintenance or enhancement of the long-term economic and social well-being of the forest workers and local communities.	6
5.2 Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Principle 6 of the certification scheme requires that forest management under the scheme 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.	6
5.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	While carbon conservation is not explicitly mentioned in the principles, the mere fact that the management of the scheme requires aspects that ensure the avoidance of deforestation and forest degradation is evidence that the scheme is implicitly aimed at enhancing the forest resources and their contribution to the carbon cycle.	6
5.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	Principle 6, and in particular its sub-principles, obliges managers to maintain or restore naturally occurring species to viable population levels within their historic ranges of abundance and distribution.	6

5. Certification of forest, forest products and forest management			
Assessment criteria	Indicator related questions	Assessment	Score
5.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Principle 6 and in particular its sub-principles requires a detailed watershed analysis and management of surrounding lands.	6
5.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	Principle 5.4 requires the strengthening and diversification of the local economy wood and non-wood supply capable of supporting continuous employment. In addition, principle 3 requires that the legal and customary rights of indigenous peoples to own, use and manage their territories and resources shall be recognized and respected.	6
5.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	There is no legal restriction to the establishment of forest and plantation schemes in areas other than the PAs. However, the absence of the legal provision for the protection of the interest of the partners in the scheme poses a risk of cancellation of the license by the government authorities on reasons that may well be more in the interest of political expedience or power plays rather than the schemes adherence to the principles. The institutional framework is a product of the principles that requires stringent measures of equity and a rights-based approach to the management partnerships of the scheme. Certification institutions exist globally and regionally. The potential for establishing a national institution is not impossible, and it as has been tried in the past.	5
Average score	Highly satisfactory		5.7

6. Joint Forest Management (JFM)

Assessment criteria	Indicator related questions	Assessment	Score
6.1 Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	In ideal situations, for collective actions (as required in JFM practices) to be worthwhile and sustainable, the benefits arising from these actions should exceed the costs of maintaining community organizations and institutions. One of the principle management objectives of JFM is to provide income to the forest-dependent/surrounding communities.	5
6.2 Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	JFM areas are managed based on management plans that have been developed in a participatory manner and take into account the fact that harvesting and fire control measures are in place.	6
6.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	JFM areas are managed based on management plans that have been developed in a participatory manner and take into account the avoidance of deforestation and forest degradation. JFM practiced at a large scale in both local forests and customary land has the potential of significantly increasing the extent of forest and tree cover.	6
6.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	The inventory used to make the JFM plan recognizes locally significant biodiversity species and provides for their conservation and or sustainable use.	6

6. Joint Forest Management (JFM)

Assessment criteria	Indicator related questions	Assessment	Score
6.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	The management plan provides for considerations for the enhancement of protective functions, such as the protection of river banks and the promotion of the maintenance of tree population, which assist in erosion control and soil nutrient recycling.	6
6.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	The whole premise for the promotion of JFM is for improved participation of local communities, including women, in the management of forest resources, with a view towards the equitable sharing of the benefits arising from the joint management. As the process of the development of the management plan is participatory ,with active involvement of the communities, cultural and spiritual values of the communities are taken into consideration. The practice provides the social safety net for the households.	6
6.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	While the policy framework supports community participation in natural resource management, the forest legislation still needs to be revised to make legal provisions for this participation. The forest legislation is in an advanced stage of review to provide for community participation. In the meantime, a statutory instrument can easily be put in place.	4
Average Score	**Highly Satisfactory**		**5.5**

7. Forest management on customary land

Assessment criteria	Indicator related questions	Assessment	Score
7.1 Optimization of forest resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The productivity of forests under customary land provides a range of products that are vital for livelihoods and for providing income to communities. Use of forest products from customary land does provide direct employment to the forest-dependent/surrounding communities.	4
7.2 Forest ecosystem health and vitality	• Is there controlled harvesting of products that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Key drivers of deforestation and forest degradation result from the how forests are used under customary land, including unsustainable harvesting methods, overexploitation of forest resources and unsustainable agricultural practices.	2
7.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	The reduction in area under natural tree cover and the associated land use changes, which contribute greatly to carbon emissions, are a result of the unsustainable use of forest resources in customary lands.	2
7.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	Conservation of locally significant biodiversity species is one of the key areas in which forest management under communal lands has played a key role. This is especially true in the past when population pressure was low and respect for traditional authority and cultural norms (e.g. respect for ancestral sites, belief in taboos, respect for the medicinal values of species) was high. However, with populations growing and traditional authority and cultural norms eroding, biodiversity loss (at genetic, species and ecosystem levels) is to a great extent attributed to the unsustainable use of forests and forest resources in the customary lands.	3

7. Forest management on customary land			
Assessment criteria	Indicator related questions	Assessment	Score
7.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Currently widely practiced forest exploitation practices by local communities and the Forestry Department (under concession and pitsaw licences) in customary lands are detrimental to the maintenance of protective functions of the forests. Examples include the over-exploitation of species from the Mushitu woodlands. The over-exploitation of forests in water catchment areas negatively affects the natural water conservation functions of the forests in terms of water flow in riverine systems and the contribution of surface water to ground water reserves. In addition, the clear felling of trees and vegetation for agriculture contributes to increased soil erosion in the forest system.	2
7.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	Current forest management practices under the customary lands are based on the maximization of socio-economic benefits to the communities and the State. However, this maximization translates into unsustainable use, resulting in increased deforestation and forest degradation. Use of indigenous knowledge in forest management practices on customary lands is widely applied and contributes to the conservation of some key forest species. Women play a key role in the management of forests under customary lands, as their harvesting practices are usually compatible with sustainable harvesting methods. The practice provides the social safety net for the majority of the rural households.	4
7.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting good forest practices in customary land?	The policy and legislative framework for sustainable management of forests under customary lands is inadequate, and its enforcement is extremely weak. The institutional framework is greatly undermined by the weakening of the traditional authority, declining respect for cultural norms and growing poverty levels that induce unsustainable practices on customary lands. The absence of a clear legislative framework for benefit sharing for community participation in forest management is a key contributor to the unsustainable use of forests on customary lands.	1
Average score	Moderately unsatisfactory		2.5

ANNEX 3.
Detailed Analysis of Land Use and Management Practices against adapted SFM criteria

1. Chitemene agriculture

Assessment criteria	Indicator related questions	Assessment	Score1
1.1 Optimization of land resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The productivity and the goods obtained under the chitemene system are quite good, but due to the land limitations, it cannot sustain significant income generation for the communities. The variety of products is also good with a number of crops being established over a cycle of the system (e.g. finger millet, beans, cassava), and some, such as finger millet, have a high but locally limited market demand.	3
1.2 Forest ecosystem health and vitality	• Are there controlled methods under the system that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	The slash-and-burn system contributes to loss of biomass and the replacement of woodland with grass and young coppice. Fire is used as a management tool in the system for turning biomass into natural ash fertilizer. Sometimes these fires escape into the surrounding forests to cause uncontrolled fires detrimental to forest health. With growing populations, this system threatens to create massive deforestation in places where it is practiced.	2
1.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	On one hand, the system contributes to the reduction in forest cover and increases carbon emissions from the burning of the pollarded branches. On the other hand, the large proportion of the biomass, in form of the tree stumps and trunks left in the field, stock carbon and facilitate rapid carbon sequestration during the post-lopping biomass regeneration period. This is in contrast to clear felling and removal of trees in agricultural fields as practiced under conventional farming systems.	3
1.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	The system is known for the use of indigenous varieties of crops (agro-biodiversity). At the ecosystem level, the practice is known to have negative ecological consequences to the forest ecosystem through its contribution to bush fires.	2

1. Chitemene agriculture

Assessment criteria	Indicator related questions	Assessment	Score[1]
1.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Ash fertilizer ameliorates acidic soil conditions but only on a short term basis. However, the cutting of tree biomass reduces the water cycling potential of the forest cover. The burning of the forest understory contributes to loss of soil cover, which contributes to soil erosion.	2
1.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	Chitemene is based on valuable indigenous technical knowledge. Women are the prime beneficiaries because the crops grown are considered women's crops, which are essential for both household food security (starch and relish crops such as cassava and beans) and income generation (beer brewing from millet). The practice provides the social safety net for rural households.	5
1.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The policy framework to improve this practice so that its negative environmental consequences can be avoided is constrained by the implementation of agricultural policy, which has not invested enough in the development of alternative innovative cost- and labour-efficient cropping technologies.	3
Average Score	**Moderately unsatisfactory**		**2.8**

1 Scoring: 5.5-6 = highly satisfactory (very high positive correlation); 4.6-5.4 = satisfactory; 3.6-4.5 = moderately satisfactory; 2.6-3.5 = moderately unsatisfactory; 1.6-2.5 = unsatisfactory; 0-0.5 = highly unsatisfactory (negative correlation).

2. Agroforestry based agriculture			
Assessment criteria	**Indicator related questions**	**Assessment**	**Score**
2.1 Optimization of land resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	Improved agroforestry systems provide a wide range of products (e.g. cereals, fruits, vegetables and fodder) that are beneficial for both household food security and income generation. The practice provides for informal on-farm self employment to rural communities.	6
2.2 Forest ecosystem health and vitality	• Are there controlled methods under the system that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Improved agroforestry systems comprise of a range of technologies, such as improved fallows, alley cropping with nitrogen fixing plants, which improve the agro-ecosystem and can encourage sustainable cost-effective permanent agriculture, leading to reduced conversion of natural forests for agricultural extensification.	6
2.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	The practice contributes to the increase in tree and vegetative cover for carbon stocking and sequestration by combing agricultural crops with trees in the same area.	6
2.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	By contributing to the reduction in the clearing of natural forests for agricultural expansion, the practice indirectly supports the conservation of the forest biodiversity. At the farm level, the practice increases the biodiversity in the agro-ecosystem.	6

2. Agroforestry based agriculture			
Assessment criteria	Indicator related questions	Assessment	Score
2.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Improving soil fertility and quality, and conserving soil and water are the key premise for the promotion of agroforestry technologies. By enhancing the soil quality, the technologies support the water retention capacities of the edaphic system, which in turn contributes to the increase in the percolation of water into the underground water reserves. Nitrogen fixing plants and leaf biomass from the tree plants add organic manure to the soils to improve the soil fertility. The farm trees also assist in nutrient recycling of leached soil nutrients.	6
2.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	Agroforestry is a predominantly people-based technology for the exclusive benefit of the communities and the environment. The development of the technologies has benefitted appreciably from indigenous technical knowledge in areas such as the use of naturally occurring-nitrogen fixing plants and good fodder plants. The participation of women is adequate as is the case with other conventional farming systems in Zambia. The practice provides the social safety net for the majority of the rural households.	6
2.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The existing policy is still inadequately manifested by the low uptake of the agroforestry technologies due to insufficient funding and incentive measures for promoting these technologies compared to, for example, the promotion and incentives for maize monocropping under conventional agricultural practices.	3
Average Score	Highly satisfactory		5.4

3. Conventional small holder agriculture (crop and animal husbandry)			
Assessment criteria	Indicator related questions	Assessment	Score
3.1 Optimization of land resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The productivity is low and not sufficient for income generation. However, the range of products is wide and market demand is quite high. Conventional small holder farming is the highest employer of rural people in Zambia.	4
3.2 Forest ecosystem health and vitality	• Are there controlled methods under the system that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Conventional smallholder agriculture cropping methods widely practiced in Zambia include the expansion of cultivated areas to compensate for the low productivity. This leads to frequent conversion of natural forests to agricultural use, thereby increasing the rate of deforestation. Animal husbandry practices also contribute to forest degradation as animals overgraze in the surrounding natural forests.	2
3.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	Conventional smallholder agriculture as explained above is a major driver of deforestation and forest degradation in Zambia.	2
3.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	Through its key contribution to deforestation and forest degradation the conventional smallholder agriculture contributes negatively to the conservation of biological diversity, especially at the species and ecosystem levels.	2

3. Conventional small holder agriculture (crop and animal husbandry)			
Assessment criteria	Indicator related questions	Assessment	Score
3.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Clear felling of trees for cropping and burning of biomass as a means of land preparation contribute to soil erosion and reduce the water retention capacity of the soils in the agro-ecosystems, which are intricately connected to the natural forest ecosystems.	2
3.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	Smallholder conventional agriculture is a predominantly people-based practice for the exclusive benefit of the communities and the nation. The development of the technologies used in this type of agriculture has benefitted appreciably from indigenous technical knowledge in many areas, such as the use of organic fertilizer from ash and cow dung, naturally occurring nitrogen fixing plants and good fodder plants. The practice provides the social safety net for the majority of the rural households.	5
3.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The existing incentive systems for maize monocropping under this land use system and the limited investment in the research and development for alternative environmentally-friendly agricultural practices promotes the continued application of this land use practice.	5
Average Score	Moderately unsatisfactory		3.2

4. Conventional commercial agriculture (crop production and animal husbandry)			
Assessment criteria	Indicator related questions	Assessment	Score
4.1 Optimization of land resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The productivity is high and yields substantial income to commercial farmers. The range of products is wide and market demand is quite high for the products derived from this practice. Commercial farming provides employment to people in both urban and rural areas Zambia.	6
4.2 Forest ecosystem health and vitality	• Are there controlled methods under the system that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Commercial agriculture cropping methods widely practiced in Zambia include the clearing of large tracts of land by clear felling of trees on farmland to allow access to farm equipment, such as tractors and harvesters, for efficient large-scale farm operations. This in turn contributes to increasing the rate of deforestation. Animal husbandry practices can also contribute to forest degradation when animal grazing is extended into the surrounding natural forests because of overgrazing. Pest management is controlled mostly by the use of chemicals that are not environmentally friendly. Fire management is usually controlled on commercial farms with fire breaks.	3
4.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	Commercial agriculture as explained above is a contributor to deforestation and forest degradation in Zambia. Farm animals also contribute to emissions from their digestive gasses. However, commercial farms, especially those dealing with animal husbandry and game ranching, tend to maintain woodlands that contribute to carbon stocking and sequestration, but these are quite few in the Zambian context.	3
4.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	The clearing of trees and vegetation on commercial farms normally is done without considering the valuable natural species found on the land to be cultivated. This contributes to biodiversity loss. Commercial agriculture is based on the cultivation of the so-called improved varieties, which further contributes to the erosion of the indigenous agrobiodiversity.	3

4. Conventional commercial agriculture (crop production and animal husbandry)			
Assessment criteria	Indicator related questions	Assessment	Score
4.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Commercial agriculture usually has well-planned methods for soil moisture retention and erosion control in-built in the cropping patterns the farmers apply as farming business risk aversion measures and to maximize productivity. However, the use of chemicals contributes to the non-point source contamination of the water system in forest systems.	4
4.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	In most cases, people's (men and women) participation in Zambia consists mainly in providing the labour force for the farm operations (employment). Insignificant indigenous knowledge is used on commercial farms.	3
4.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The policy environment in favour of commercial agriculture is adequately conducive for the promotion of commercial agriculture (e.g. zero tax ratings on some agricultural equipment)	5
Average Score	Moderately satisfactory		3.8

5. Conservation agriculture

Assessment criteria	Indicator related questions	Assessment	Score
5.1 Optimization of land resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the common products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The productivity under the existing conservation farming practices is quite high, considering the reduced use of inorganic fertilizers. In addition, the variety of crops that can be planted is diverse. The products have a market value. The practice provides income generation to farmers, perhaps in ways that are more soil-input and cost-effective. However, the labour requirements that limit the area of cultivation may offset the gains from the low-input costs.	4
5.2 Forest ecosystem health and vitality	• Are there controlled methods under the system that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Conservation agriculture encourages the minimum disturbance to the land under cultivation, thereby contributing to a more sustainable and permanent cropping system that avoids unnecessary and frequent opening up of new land. This helps in avoiding deforestation.	5
5.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	Conservation agriculture encourages the cycling of organic matter back into the soil for soil fertility maintenance as opposed to burning, which contributes to emissions. Minimum soil disturbance also contributes to underground carbon stocking. However, the current technologies are still in a state where the labour requirements for practicing conservation agriculture are so labour-intensive that only small areas are amenable to the practice. This reduces the potential impact on the need for agricultural extensification and consequently contributes negligibly to the avoidance of deforestation.	4
5.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	By contributing to the reduction in the clearing of natural forests for agricultural expansion the practice indirectly contributes to the conservation of the forest biodiversity.	4

5. Conservation agriculture			
Assessment criteria	Indicator related questions	Assessment	Score
5.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Minimum tillage and organic manure conservation improve soil conditions and fertility as well as conserve water in agro-ecosystems, which are part of the continuum of the forest ecosystem.	6
5.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	Conservation agriculture is a predominantly people-based technology for the exclusive benefit of the communities and the environment. The participation of women is adequate as is the case with conventional farming systems in Zambia. The practice provides a social safety net for the majority of the rural households.	6
5.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The existing policy is still inadequately manifested by the low uptake of the conservation agriculture technologies due to insufficient funding and incentive measures for promoting these technologies, compared to, for example, the promotion and incentives for maize monocropping under conventional agricultural practices.	3
Average Score	Satisfactory		4.5

6. Woodland beekeeping

Assessment criteria	Indicator related questions	Assessment	Score
6.1 Optimization of land resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the common products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	Beekeeping has high productivity and has a range of products (e.g. honey, bees wax, propolis) that are of high value and have a high market demand. The practice is capable of providing direct income and employment to communities.	6
6.2 Forest ecosystem health and vitality	• Are there controlled methods under the system that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	Beekeeping is dependent on the conservation of the forest area for the bees to thrive and be productive. Sustainable forest management is a prerequisite for sustained beekeeping. However, the use of bark hives can offset the positive contribution beekeeping makes to avoiding forest degradation as the debarked trees will die. Continued application of this method of beekeeping by an increasing number of beekeepers can lead to significant forest degradation.	5
6.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase the area and cover under natural and manmade forests?	Noting that sustainable forest management is the prerequisite for sustained beekeeping, it follows that the practice can make great contribution to the avoidance of forest degradation and deforestation, thereby contributing to carbon stocks and carbon sequestration.	6
6.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	In addition to being a contributor to the avoidance of forest degradation and deforestation, beekeeping plays an important role in pollination that helps to maintain and enhance biodiversity in the forest ecosystems.	6

6. Woodland beekeeping

Assessment criteria	Indicator related questions	Assessment	Score
6.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	Woodland beekeeping contributes indirectly to the avoidance of deforestation and forest degradation.	6
6.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	The majority of beekeepers are rural dwellers, and beekeeping provides a social safety net for these people. Most of the expertise used in beekeeping is derived from indigenous knowledge. Traditionally women are not key participants in beekeeping. Traditional honey beer for ceremonies in the North-West province of Zambia is a contribution that beekeeping makes to maintaining cultural and spiritual values.	6
6.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The current policy framework in support of beekeeping is weak in enforcement. This is manifested by stagnant public investments in research and development in the sub-sector. However the private sector is expected to offset this weakness. The institutional arrangements based on the partnerships between the communities and the private sector need to be encouraged ensuring due diligence for equitable distribution of benefits arising from such partnerships.	4
Average Score	**Highly satisfactory**		**5.5**

7 Community-Based Natural Resource Management (CBNRM)			
Assessment criteria	Indicator related questions	Assessment	Score
7.1 Optimization of land resource utilization	• Is the productivity of the goods and services under the practice sufficient for income generation? • Is there a variety of products and/or functions derived from the practice that increase its economic value? • Do the products derived from the practice have a high market demand? • Does the practice render itself to providing direct income and employment to forest dependent/ surrounding communities?	The economic logic for CBNRM is that the net benefits from community management of common resources outweigh the transaction costs of collective action. CBNRM is concerned with resources that need to be managed collectively and that have sufficient value to make this worthwhile. This is true for wildlife resources in Zambia. The variety in products include different species available for both consumptive and non-consumptive tourism activities promoted in the GMAs. The practice provides direct employment to the communities.	5
7.2 Forest ecosystem health and vitality	• Are there controlled methods under the system that avoids the degradation of the forest ecosystem? • Are protection measures applied for fire and pest management?	The management plans for GMAs clearly oblige the managers to manage the areas with minimum disturbance of natural resources, both wildlife and vegetation. Fire management is a core function.	5
7.3 Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.	• Does the practice significantly contribute to carbon conservation (emission avoidance), sequestration and substitution? • Does the practice increase area and cover under natural and manmade forests?	The minimal disturbance of the forests in the GMAs greatly contributes to the reduced forest degradation and significantly limits the rate of deforestation as this is the main habitat for wildlife survival. The PA status of the GMAs allows them to maintain the forest area, thereby helping to increase the aggregate extent of forest and tree cover.	5
7.4 Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	• Does the practice protect locally significant and endangered species? • Does the practice contribute to the protection or enhancement of the functioning of other ecosystems? • Does the practice encourage the existence of a variety of species?	The first principle for the establishment of GMAs is to create a buffer for the National Parks to help in the conservation of biodiversity of plant and animal species.	6

7 Community-Based Natural Resource Management (CBNRM)			
Assessment criteria	Indicator related questions	Assessment	Score
7.5 Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).	• Does the practice contribute to the maintenance and or enhancement of quality surface and/or ground water availability? • Does the practice contribute to the maintenance and or enhancement of the soil fertility and or reduced soil erosion in the forest system?	The maintenance of viable populations and communities of both animal and plant species contributes to the maintenance of soil and water conservation. Plant species play a role in conserving water and protecting soil fertility and quality. Under ideal population densities, animals play a significant contribution to maintaining soil fertility.	6
7.6 Maintenance of other socio-economic and cultural functions and conditions.	• What is the degree of people's participation in management and benefit sharing? • What is the degree of use of indigenous knowledge application? • Does the practice infringe on the cultural and spiritual values and benefits of the communities? • What is the degree of participation of women?	CBNRM evolved and is practiced around the principle of community (men and women) participation in natural resource management and the sharing of the benefits accruing from the protected resources.	6
7.7 Adequacy of policy, legal and institutional framework.	• Is the existing policy and legal framework conducive for the promotion of the practice? • Is the existing institutional framework conducive for promoting the practice?	The legal provisions for the implementation of CBNRM exist and are driving the sustainable management of wildlife in Zambia. However, deficiencies in implementation of the provisions are of concern with regard to sustaining this approach. This is especially true regarding aspects related to benefit sharing, Community shares are usually disbursed very late, and the current divisions of shares between the community and ZAWA are still contentious.	4
Average score	Satisfactory		5.3

ANNEX 4.
Detailed Analysis of forest management categories and practices against adapted REDD+ criteria

1. Protected forest areas: National Forests		
Assessment criteria	**Indicator related questions**	**Assessment**
Biomass and Carbon levels in the ecosystem.	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data.
1.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	There is a lack of quantitative and qualitative data on threat level for ecosystems in Zambia. This is an area warranting further research. However, anecdotal evidence points to human encroachments for settlements with the accompanying need for agricultural lands and over exploitation of wood products as the greatest threats to the National Forests. NBSAP (1999) estimated that about 20 percent of forest reserves are either encroached or depleted as a result of the combination of these threats.
1.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The opportunity costs for the maintenance of PAs can be considered as high, as these protected forests are sources of fertile land and a good number of forest products that are essential for supporting rural and urban livelihoods. The growing population, the increased need for new land for agriculture and the demand for wood products necessitate frequent encroachments into PAs and other virgin lands. However, to make a more conclusive assessment of the real opportunity costs of using National Forests as a model for the implementation of the REDD+ concept and practice, one would have to include in the equation the economic valuation of the ecosystem services (soil, water and biodiversity conservation) provided by the National Forests.
1.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	The land tenure regime governing National Forests is clear. National Forests are under the jurisdiction of State land, which is solely controlled by the State.
1.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners and are transparent and accountable to each other?	National Forests are public service-dominated, with no degree of people's participation in their management. The benefits shared by the forest-dependent communities accrue only to the extent of the licensing for the removal of the prescribed products by the Forestry Department. The Forestry Department is the custodian for the management of the National Forests on behalf of the government under an Act of Parliament that provides the legal provisions for the administration of these reserves. Based on the current National architecture of the REDD+ initiative, the Forestry Department is a leading partner in the REDD+ initiative.
1.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	National Forests in areas of high population pressure are very likely to cause direct emissions in other surrounding areas. The strict restrictions for the use of these forests by communities will lead to the communities resorting to other surrounding forests to fulfil their need for new land and forest products to sustain their livelihoods.

1. Protected forest areas: National Forests		
Assessment criteria	**Indicator related questions**	**Assessment**
1.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	With strict forest legislation enforcement and adherence to National Forest management plans, National Forests can remain relatively undisturbed or maintain their conservation status, which can contribute to the slowing down of deforestation and forest degradation.
1.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	The current trends in Zambian politics favour the de-gazetting of protected forests as opposed to scaling them up. A very convincing compensatory mechanism for the forest-dependent communities and the government would have to prevail for any scaling up to gain political support. Hence the likelihood of scaling up the protected forest area is very much dependent on the socio-economic and political acceptability of the national REDD+ interventions.
1.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	As administered at the moment, the potential for the presence of National Forest to contribute to the social and economic welfare of forest-dependent communities is negligible. However, in the event of a well-designed governance and benefit-sharing scheme, the contribution can be enhanced. National Forests protect water catchment areas that contribute to national hydrological services and their economic spin offs (e.g. hydropower generation, irrigation, fisheries). If payments for these services are equitably shared with the forest-dependent communities, National Forests have the potential to substantially improve socio-economic co-benefits. National Forests primarily protect watershed areas that contribute significantly to the maintenance and enhancement of environmental flows. Undisturbed vegetation cover also contributes significantly to controlling soil erosion. The litter and the soil nutrient cycling characteristic of the vegetation contribute to the soil fertility of forest systems. NBSAP inventory estimates a total of 3 774 species of both lower and higher plants in the broad category of botanical and forest reserves.
1.10 Compatibility with other livelihood activities	Does the practice enhance/conflict with other livelihood activities?	National Forests are compatible with other economic livelihood activities in forest-dependent communities. They contribute to water and soil conservation and nutrient recycling functions that are critical to farming, the main livelihood activity of the majority of forest-dependent communities in Zambia.

2. Protected forest areas: Local Forests		
Assessment criteria	**Indicator related questions**	**Assessment**
2.1 Biomass and Carbon levels in the ecosystem.	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
2.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	As mentioned earlier under the assessment of National Forests, the data on threat level for ecosystems in Zambia is generalized. However anecdotal evidence points to human encroachments for settlements with the accompanying need for agricultural land, the over-exploitation of wood products and charcoal production as the greatest threats to Local Forests. The estimated 20 percent of forest reserves being either encroached or depleted by the National Biodiversity Strategy and Action Plan (NBSAP), includes Local Forests. This threat is quite high, especially considering that Local Forests are relatively small in area and in close proximity to human settlements.
2.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The opportunity cost for maintaining Local Forests is quite high. Local forests are managed for the provision of a sustainable supply of wood and NWFPs to the communities under licensing arrangements. However, the licensing is currently weakly enforced. Opportunity costs are high due to the proximity of the Local Forests to human settlements, the need for agriculture expansion, the need for new settlements to accommodate growing populations and the demand for wood products.
2.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	Local Forests are under the jurisdiction of State land, which is controlled by the State, except in areas where the local forests have been declared JFM areas and joint management is supposed to be practiced. However, even in the JFM areas the land is still under the control of the State.
2.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners and are transparent and accountable to each other?	Local Forests are public service-dominated with no degree of people's participation (except in those declared JFM areas) in their management, with the benefits accruing only to the extent of the licensing for the removal of products by the Forestry Department. Furthermore the harvesting of NWFPs is not restricted in the local forest as is the case is for the National Forests. Therefore a certain level of benefits are shared by the communities, especially women who are the major collectors of NWFPs for household use and income generation. The Forestry Department is the custodian for the management of the Local Forests on behalf of the government under an Act of Parliament that provides the legal provisions for the administration of these reserves. Based on the current national architecture of the REDD+ initiative the Forestry Department is a leading partner in the REDD+ process.
2.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	Local Forests are very likely to cause direct emissions in other surrounding areas due to their proximity to communities that need land for agriculture and forest products for their livelihoods.

2. Protected forest areas: Local Forests		
Assessment criteria	**Indicator related questions**	**Assessment**
2.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	With strict forest legislation enforcement and planned management implementation, the forests can remain relatively undisturbed or maintain their conservation status, which can contribute to the slowing down of deforestation and forest degradation.
2.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	The current trends in Zambian politics favour the degazzeting of protected forests as opposed to scaling them up. A very convincing compensatory mechanism for the forest-dependent communities and the government would have to prevail for any scaling up to gain the political support. Hence, the likelihood of scaling up the protected forest area is also dependent on the political will and the design of the REDD+ activities in relation to incentive measures for their conservation and or sustainable use.
2.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	As administered at the moment, the potential for the presence of Local Forest areas to contribute to the social economic welfare of forest-dependent communities is negligible. However, as stated in the National Forest assessment above, with well-designed governance and benefit-sharing schemes, the co-benefits can be enhanced. When one considers the variety of products that can be harvested from Local Forests, the potential exists for improving the social benefits, especially in terms of providing social safety nets in difficult times,. Under controlled harvesting prescriptions, Local Forests contribute to the protection of a variety of species. Their conservation assists in the maintenance and functioning of wetlands and agro-ecosystems through their role in water conservation, soil erosion control and nutrient recycling.
2.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	Local Forests are very compatible with other economic livelihood activities of forest-dependent community. Local Forest ecosystem services contribute to water and soil conservation and nutrient recycling functions that are critical to farming. The forest products harvested under license enhance the income generation and household food security in the communities. If reserved for REDD+ activities, Local Forests reduce the area that may be converted to other land use.

3. Conventional Commercial Plantations

Assessment criteria	Indicator related questions	Assessment
3.1 Biomass and Carbon levels in the ecosystem.	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
3.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	The threats to deforestation and degradation are relatively minimal due to the intensive management and protection regimes under commercial plantations.
3.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The forgone benefits are high as there are only a limited number of beneficiaries (plantation owners) of the income accruing from the plantations. The range of products is reduced and narrowed to a few that are highly valuable, such as timber and honey, as opposed to the variety of forest products available under natural vegetation. However, in cases where the commercial plantations provide formal and long-term employment to the surrounding communities, the level of the forgone benefits is reduced.
3.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	The land tenure regime under commercial plantations is clear. The land is under leasehold title of the plantation owners. This makes the possibilities for permanence high.
3.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners and are transparent and accountable to each other?	People's participation in plantations is limited to the provision of labour rather than decision making. This labour is not restricted to any gender as a matter of official policy of most commercial plantations. It is a practice dominated by intensive formal silvicultural science. Commercial plantations are run as businesses, and therefore people's participation cannot be a mandatory requirement. Depending on the history of the sites and whether a dysfunctional regulatory framework (corruption) is in place, just as with the establishment of settlements, plantations can displace people and/or infringe on the spiritual and cultural values of resident communities. The legal framework for the establishment of plantations in Zambia is adequate. At the institutional level, the establishment of plantations provides a viable avenue for Public Private Partnerships (eligible under REDD+) approach to multiple economic gains from wood products and carbon conservation initiatives.
3.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The leakage risk is high under the plantation regimes as vast areas of land under which they are established cannot be accessed by the surrounding communities for forest or agricultural livelihood activities.
3.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	Commercial plantations have the potential for permanence of a standard standing volume being ensured all the time. Commercial plantations also contribute to carbon substitution through the transfer of forest biomass into products that can replace fossil-fuel based energy sources and cement-based products. Under current practices, less than 40 percent of the standing volume is converted into a marketable product that is carbon stored.

3. Conventional Commercial Plantations		
Assessment criteria	**Indicator related questions**	**Assessment**
3.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Plantations can be replicated to other areas as long as the investment costs can be covered by the-would-be operators. The establishment of plantations also provides the opportunity for degraded land rehabilitation, which can contribute to the expansion of land under forests for biomass stocking and carbon sequestration.
3.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	Where plantations are designed to provide employment to a significant number of surrounding communities, the employment factor provides social co-benefits. ZAFFICO and CFC in Zambia annually employ thousands of people as a large part of their work is seasonal. Local communities have established mobile markets to supply food to plantation workers, which is promoted by ZAFFICO. Until 2010, ZAFFICO was subcontracting for the supply of seed for which it was spending more than K1 billion annually to various suppliers (Mwitwa, Personal communication, 2012). Commercial plantations are not known to play a direct significant role in enhancing local biodiversity, especially as they are predominantly based on the establishment of fast growing exotic species. Furthermore, plantations replacing intact natural forests will negatively impact on biodiversity. In some instances invasive exotic species can be detrimental to the natural forests around plantations. However, when one considers that plantations may relieve the wood pressure from the natural forest, this may indirectly contribute to the conservation of biodiversity, especially at the ecosystem level. Debate on the effects of certain exotic species negative impact on the natural hydrology systems is still inconclusive. However, the standing plantations do play a role in regulating soil erosion and improving ground water retention in the forest systems.
3.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	Commercial plantations are compatible with other livelihoods activities, such as trading, manufacturing and construction, through the provision of raw wood and NWFP material. Plantations are in conflict with the supply of a range of NWFPs.

4. Certification		
Assessment criteria	**Indicator related questions**	**Assessment**
4.1 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data. In 2004, Njovu estimated the area under certification to be well above 7.5 million ha of woodland and forest.
4.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	Threat levels in the forest certified schemes is low because their establishment takes into consideration the needs and involvement of the communities adjacent to the certified forest. Under plantation certified schemes, the threat level is even less due to their additional intensive management and protection regimes. However, for commodity certification in forests under the customary land, the threat levels will be higher as the land in question is not necessarily managed for conservation but rather for the product quality against prescribed organic substances and has an open access status.
4.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	For certified forest schemes, the opportunity cost is likely to be low due to the certification requirement to maintain or enhance the long-term economic and social well-being of forest workers and local communities.
4.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	Certification principles require that the legal and customary rights of indigenous peoples to own, use and manage their territories and resources are recognized and respected. Land tenure arrangements under certification schemes can take the form of State land under certified forests, plantation leaseholds, and customary land under commodity certification in open forests.
4.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners and are transparent and accountable to each other?	Forest certification principles include the requirement that the legal and customary rights of indigenous peoples to own, use and manage their territories and resources should be recognized and respected. The Forestry Department is party to the institutional arrangement for the establishment and administration of the forest certification schemes. Its main responsibility is in the monitoring of the administration and management of the schemes to ensure the environmental sustainability of the forest resources and the redistribution of the benefits arising from the schemes. There is no legal restriction to the establishment of forest and plantation schemes in areas other than PAs. However, the absence of the legal provision for the protection of stakeholder interests in the scheme poses a risk of cancellation of the license. Government political expedience or power plays may jeopardize scheme operations. Private sector, NGOs and communities that alone or collectively manage certification schemes are all eligible under REDD+. The certification principles contain safeguards for accountability and transparency.

4. Certification

Assessment criteria	Indicator related questions	Assessment
4.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	Leakage risk from forest certification schemes is likely to be low as the principles governing the establishment takes into account assurances that the schemes are in harmony with the sustenance of the community livelihood requirements.
4.7 Permanence	• Does the practice have the propensity to remain forested or undegraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	The strict management requirements, including the frequent inspections by certifiers to the adherence of the management plans, are more likely to ensure the relative permanence of a standing stock and the slowing down of deforestation and forest degradation.
4.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Forest certification schemes have the potential to be replicated in other areas, as long as the investment costs can be covered.
4.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	Forest certification principles require the strengthening and diversification of the local economy wood and non-wood supply capable of supporting continuous employment. In addition, certification scheme requires that forest management under the scheme 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.
4.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	Certification schemes support livelihood activities, such as trading and construction, through the provision of both wood and non-wood raw materials that fetch a much higher market value.

5. Joint Forest Management (JFM)

Assessment criteria	Indicator related questions	Assessment
5.1 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
5.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	JFM areas are managed based on management plans that are developed in a participatory manner that aim at reduced threats to the declared JFM areas. Hence, ideally the threat levels are likely to be low.
5.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The premise for the promotion of JFM is for improved participation of the communities, including women, in the management of the forest resources with a view towards equitable sharing of the benefits arising from the joint management. As the process of the development of the management plan is participatory, with the active involvement of the communities, cultural and spiritual values of the communities are taken into consideration. The practice provides the social safety net for the adjacent communities. As a result, the opportunity costs associated with the JFM approach are likely to be low.
5.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	JFM areas were declared in Local Forests, which have State land status.
5.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners and are transparent and accountable?	The premise for the promotion of JFM is for improved participation of the communities, including women, in the management of the forest resources. While the environmental and forest policy framework supports community participation in natural resource management, the forest legislation still needs to be revised to make legal provisions for this participation. The forest legislation is in an advanced stage of being reviewed to provide for community participation. In the meantime, a statutory instrument can easily be put in place for this purpose. The principle players in joint management are the communities and the government who are both eligible for REDD+. However, the trust and accountability towards each of the partners would need to be very strong to be effective for REDD+ activities.
5.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The JFM approach is likely to cause direct emissions in other surrounding areas due to their proximity to human settlements that need land for agriculture.

5. Joint Forest Management (JFM)		
Assessment criteria	Indicator related questions	Assessment
5.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	JFM areas are managed based on management plans that have been developed in a participatory manner and take into account the avoidance of deforestation and forest degradation. JFM practiced at a large scale in both Local Forests and on customary land has the potential of significantly slow down deforestation and degradation if communities can realize the benefits of sustainably managing the forests.
5.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	JFM can be replicated in both Local Forests and other types of forests. The approach offers good potential for forest management at a national scale.
5.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	One of the principle management objectives of JFM is to provide socio-economic benefits (including income) to the forest-adjacent communities. In addition, the approach supports the strengthening of social cohesion and networks through collective action for the management of the declared JFM area. The inventory used to make the JFM plan recognizes the occurrence of locally significant biodiversity species and provides for their conservation and or sustainable use. The management plan provides for the enhancement of protective functions, such as the protection of river banks and the promotion of the maintenance of tree population, which will assist in erosion control and soil nutrient recycling.
5.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	In addition to the environmental contribution of a sustainably managed forest to the water and soil conservation to the broader agro-ecological systems surrounding them, the JFM approach by design is compatible to other livelihood activities, such as trading and crafts manufacturing, by providing both wood and NWFPs harvested from the sustainably managed JFM areas..

6. Forest management on customary land		
Assessment criteria	**Indicator related questions**	**Assessment**
6.1 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	No data available.
6.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	The threat levels are extremely high in open forests under customary land because of the great demand for agricultural expansion, wood products, charcoal production and the weak enforcement of the laws governing their use. However some of the forests that are managed in ways that respect ancestral beliefs and taboos have low threat levels.
6.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The forgone tangible costs are very low as the communities maximize the use of the forests for their livelihood activities. However, if one can value the loss of the intangible benefits, in the terms of the decline in ecological functions, this opportunity cost could rise.
6.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	The tenure under customary lands is administered by chiefs on behalf of the State. The ownership of land by community members is maintained through usufruct rights conferred on a piece of land by the traditional authorities. However legally the land still belongs to the State. This situation would need to be resolved within the context of the design of the REDD+ activities to be implemented at community level.
6.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners?	People are the major players in the field management while the Forestry Department plays the monitoring role for compliance to allowable use practices based on the existing legislation. The policy and legislative framework for sustainable management of forests under customary lands is adequate, but its enforcement is extremely weak. The institutional framework is greatly undermined by the weakening of traditional authorities, declining respect for cultural norms and growing poverty levels that induce unsustainable practices on customary lands. Governance of customary land is further complicated by the multiple land use needs and institutional interests outside the forest sector, such as agriculture, mining and roads.

6. Forest management on customary land		
Assessment criteria	**Indicator related questions**	**Assessment**
6.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The risk for leakage is likely to be high as the need for the multiple uses of forests under the customary land are equally high. On the other hand, the level of leakage will be a function of a number of socio-economic factors, such as the population pressure and alternative livelihood options in the proposed areas where the REDD+ activities are being implemented, including the nature of the REDD+ activities proposed.
6.7 Permanence	• Does the practice have the propensity to remain forested or undegraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	The likelihood of permanence and the slowing down of deforestation in forests under customary land will be a function of the design of the REDD+ activities proposed and the benefits accruing to the communities that compensate for the opportunity costs for implementing the activities.
6.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	The potential for scaling up of replication is also dependent on the design of the REDD+ activities to be implemented.
6.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	The improvement of the co-benefits will also depend on the design of the REDD+ activities to be implemented.
6.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	The enhancement of other livelihood activities will also depend on the design of the REDD+ activities to be implemented.

ANNEX 5.
Detailed Analysis of Land Use and Management Practices against adapted REDD+ criteria

1. Chitemene agriculture		
Assessment criteria	**Indicator related questions**	**Assessment**
1.3 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
1.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	The threat levels for deforestation and forest degradation for Chitemene practices under an increasing population pressure are very high.
1.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	Not applicable.
1.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	Chitemene is practised under customary lands where the tenure is administered by chiefs. The ownership of land by community members is maintained through usufruct rights conferred on a piece of land by the traditional authorities. However, legally the land still belongs to the State. This situation would need to be resolved within the context of the design of the REDD+ activities to be implemented at community level.
1.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners?	Community members with usufruct rights to customary land are the sole beneficiaries from this practice. The policy framework to improve this practice so that its negative environmental consequences can be avoided is constrained by agricultural policy implementation, which has not invested enough in the development of alternative innovative cost- and labour-efficient cropping technologies. This inadequate investment in alternative technologies is detrimental to the desired REDD+ outcomes as people are forced to open new forest lands to continue this practice. The Department of Agriculture and the communities are eligible for registration under REDD+.
1.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	Slash-and-burn system contributes to loss of biomass and to the replacement of woodland with grass and young coppice. Fire is used as a management tool in the system for turning biomass into natural ash fertilizer. Sometimes these fires escape into the surrounding forests to cause uncontrolled fires that are detrimental to forest health. As populations grow, this system threatens to create massive deforestation in places where it is practiced.

1. Chitemene agriculture		
Assessment criteria	**Indicator related questions**	**Assessment**
1.7 Permanence	• Does the practice have the propensity to remain forested or undegraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	Chitemene system by design requires the opening up of new land after a cycle of about three to four years, and therefore does not slow down the rate of deforestation or forest degradation.
1.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Chitemene is easily replicable to other areas as evidenced by its spread to other provinces. This has led to its transformation from a system based on the pollarding of big trees to the actual cutting down of the trees to lower heights and burning them, which is practiced in other provinces of Zambia.
1.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	Chitemene is based on valuable indigenous technical knowledge. Women are the prime beneficiaries because the crops grown are considered women's crops that are essential for both household food security (starch and relish crops such as cassava and beans) and income generation (beer brewing from millet). The practice provides the social safety net for the majority of rural households. At the ecosystem level, the practice is known to have negative ecological consequences on forest ecosystems because of its contribution to bush fires Ash fertilizer is known to ameliorate acidic soil conditions but only on a short term basis. The cutting of tree biomass reduces the water cycling potential of the forest cover. The burning of the forest understory contributes to loss of soil cover which contributes to soil erosion.
1.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	Chitemene is a low-labour and low-external input form of agriculture, which allows smallholders to undertake other livelihood activities (e.g. trading and harvesting of NWFPs). Chitemene agriculture also generates income to the household through the cultivation of millet for raising labour through labour parties, and through sales of beer.

2. Agroforestry-based agriculture		
Assessment criteria	**Indicator related questions**	**Assessment**
2.1 Biomass and Carbon levels in the ecosystem.	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
2.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	Agroforestry systems comprise of a range of technologies, such as improved fallows, alley cropping with nitrogen fixing plants, which improve the agro-ecosystem and can encourage sustainable cost-effective permanent agriculture, leading to reduced conversion of natural forests for agricultural extensification. Agroforestry-based agriculture can greatly contribute to the reduction of threat levels in the areas where it is practiced.
2.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	No non-opportunity costs can be associated with this practice for reducing the rate of deforestation or forest degradation. Inversely, agroforestry agricultural systems provide a wide range of products (e.g. cereals, fruits vegetables and fodder) that are beneficial for both household food security and income generation.
2.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	Agroforestry-based agriculture is practised under customary lands where the tenure is administered by chiefs on behalf of the State. The ownership of land by community members is maintained through usufruct rights conferred on a piece of land by the traditional authorities. However, legally the land still belongs to the State. This situation would need to be resolved within the context of the design of the REDD+ activities to be implemented at farm level. Investment in the growing of trees at farm level can be enhanced by assurances that the farm cannot be expropriated easily without recourse to a legally-binding title to land.
2.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level?	Agroforestry is a predominantly people-based technology for the exclusive benefit of communities and the environment. Support services to the promotion of this practice include government agricultural research and extension services and NGOs, which are eligible under REDD+. The existing policy is still inadequately manifested by the low uptake of the agroforestry technologies due to insufficient funding and incentive measures for promoting these technologies compared to, for example, the promotion and incentives for maize monocropping under conventional agricultural practices.

2. Agroforestry-based agriculture		
Assessment criteria	**Indicator related questions**	**Assessment**
2.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The practice is likely to reduce leakage by contributing to the practice of permanent agriculture.
2.7 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Agroforestry has a number of technologies that make its replicability very high under varying ecological and socio-economic conditions around the country.
2.8 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	Agroforestry systems provide a wide range of products (e.g. cereals, fruits vegetables and fodder) that are beneficial for both household food security and income generation. By contributing to the reduction in the clearing of natural forests for agricultural expansion, the practice indirectly contributes to the conservation of the forest biodiversity. At the farm level, the practice increases the biodiversity in the agro-ecosystem. Soil fertility and quality improvements and soil water conservation are the key premise for the promotion of agroforestry technologies. By enhancing the soil quality, the technologies support the water retention capacities of the edaphic system, which in turn contributes to the increase in the percolation of water into the underground water reserves. Nitrogen fixing plants and leaf biomass from the tree plants add organic manure to the soils to improve soil fertility. The farm trees also assist in nutrient recycling of leached soil nutrients.
2.9 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	Agroforestry technologies can enhance a number of other livelihood activities, such as trading a range of products harvested from the system.

3. Conventional smallholder agriculture (crop and animal husbandry)		
Assessment criteria	**Indicator related questions**	**Assessment**
3.1 Biomass and Carbon levels in the ecosystem.	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Data available under ILUA.
3.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	Conventional smallholder agriculture cropping methods widely practiced in Zambia include the extensification of area under cultivation to compensate for the low productivity. This in turn leads to frequent conversion of natural forests to agricultural use, thereby increasing the rate of deforestation. Animal husbandry practices also contribute to forest degradation because animals overgraze in the surrounding natural forests.
3.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The unsustainable farming practices lead to loss of land for agricultural production and reduced livelihood options.
3.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	Conventional small holder agriculture is practised under customary lands where the tenure is administered by the chiefs on behalf of the State. The ownership of land by community members is maintained through usufruct rights conferred on a piece of land by the traditional authorities. However, legally the land still belongs to the State. Ownership of the land by the households may stimulate them to invest in sustainable agricultural methods
3.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners?	Smallholder conventional agriculture is a predominantly people-based practice for the exclusive benefit of the communities and the nation. Support services are provided by the government extension services, NGOs and private companies, which are all eligible under REDD+. The existing incentive systems for maize monocropping under this land use system and the limited investment in the research and development for alternative environmentally-friendly agricultural practices promotes the continued application of this land use practice. In terms of REDD+, these can be perceived as perverse incentives.

3. Conventional smallholder agriculture (crop and animal husbandry)		
Assessment criteria	**Indicator related questions**	**Assessment**
3.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The semi-permanent character of this system of this type of agriculture contributes to high leakage risks.
3.7 Permanence	• Does the practice have the propensity to remain forested or undegraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	No permanence, and the methods employed are major contributors to deforestation.
3.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Not applicable.
3.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	The productivity is low and not sufficient for income generation. However, the range of products is wide and market demand is quite high for products derived from this practice. Conventional small holder farming is the highest employer of rural people in Zambia. Through its key contribution to deforestation and forest degradation, the practice contributes negatively to the conservation of biological diversity, especially at species and ecosystem levels. Clear felling of trees for cropping and burning of biomass as a means of land preparation contribute to soil erosion and reduces the water retention capacity of the soils in the agroecosystem, which is intricately connected to the natural forest ecosystem.
3.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	The practice is a major contributor to agricultural production, trade and processing in some key crops, such as maize.

4. Conventional commercial agriculture (crop production and animal husbandry)		
Assessment criteria	**Indicator related questions**	**Assessment**
4.1 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Data not available.
4.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	Commercial agriculture cropping methods widely practiced in Zambia include the clearing of large tracts of land using clear felling of trees on farmland to allow for the use of farm equipment, such as tractors and harvesters, for efficient large-scale farm operations. This in turn contributes to increasing the rate of deforestation. Animal husbandry practices can also contribute to forest degradation when animal grazing is extended into the surrounding natural forests because of overgrazing. Pest management is controlled mostly by chemicals that are not environmentally friendly when used continuously over a long period, especially when non biodegradable pesticides are used. Fire management is usually controlled on commercial farms using fire breaks.
4.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	Commercial farmers who set aside land for forest forgo an opportunity to expand cultivation. However, considering that some of the farm land is less productive, developing 'farm forestry for REDD+' may actually provide an attractive opportunity cost to the farmer.
4.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	Land is under the leasehold title of the farmer and therefore encourages investments on the farms.
4.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners?	In most cases people's (men and women) participation in Zambia is mostly in terms of providing the labour force for the farm operations (employment). Commercial farmers are also entitled to be supported by government research and extension services and work very closely with other registered private sector support services, which are eligible under REDD+. The Agriculture Commercialization policy supports commercial agriculture.

4. Conventional commercial agriculture (crop production and animal husbandry)		
Assessment criteria	**Indicator related questions**	**Assessment**
4.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The commercialization of huge tracts of land is likely to lead to the communities around opening up other areas for agriculture, settlements and other purposes, increasing the leakage risk.
4.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	Yes. Land left forested under private title deed has the potential to remain undisturbed for long periods of time.
4.7 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Significant. Many so-called under-utilized commercial farms (defined as farm with title deed) exist in Zambia which could be brought into a 'farm forestry for REDD+' initiative.
4.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	Only in as far as providing employment. However, the heavy mechanization of commercial farming allows for limited number of people to be permanently employed on commercial farms. The clearing of trees and vegetation on commercial farms normally does not take into account the valuable natural species found on the land, and hence contributes to biodiversity loss. Commercial agriculture is based on the use of the so-called improved varieties, which further contributes to the erosion of the indigenous agrobiodiversity. Commercial agriculture usually has well-planned methods for soil moisture retention and erosion control inbuilt in the cropping patterns the farmers apply as farming business risk aversion measures and to maximize productivity. However, the use of chemicals contributes to the non-point source contamination of the water system in the forest systems.
4.10 Compatibility w. livelihood	• Does the practice enhance/conflict with other livelihood activities?	Main contributor to the agricultural trading and processing industry.

5. Conservation agriculture		
Assessment criteria	**Indicator related questions**	**Assessment**
5.1 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
5.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	Conservation farming encourages the minimum disturbance to the land and maintains soil fertility and quality, thereby contributing to the maintenance of a more sustainable and permanent cropping system that avoids unnecessary and frequent opening up of new land. This helps in avoiding deforestation.
5.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	No non-forgone benefits
5.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	When conservation farming is practised under customary lands, tenure is administered by the chiefs; when practiced on commercial farms it is under the leasehold title of the farmer or company. The promotion of conservation farming on customary land could benefit from resolving the land rights of small-scale farmers to leasehold title status.
5.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners?	Conservation farming is a predominantly people-based technology for the exclusive benefit of the communities, individual farmers and the environment. The existing policy is still inadequately manifested by the low uptake of the agroforestry technologies due to insufficient funding and incentive measures for promoting these technologies compared to, for example, the promotion and incentives for maize monocropping under conventional agricultural practices.

5. Conservation agriculture		
Assessment criteria	**Indicator related questions**	**Assessment**
5.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The practice is likely to reduce leakage by contributing to the practice of permanent agriculture.
5.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	The practice is likely to contribute to the slowing down of deforestation by promoting the practice of permanent agriculture.
5.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Conservation farming is replicable in similar areas.
5.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	Sustained agricultural productivity will result in sustained income generation and resilience to climate change-related (especially drought) risks. By contributing to the reduction in the clearing of natural forests for agricultural expansion, the practice indirectly contributes to the conservation of forest biodiversity. Minimum tillage and organic manure conservation improves both soil conditions and fertility and conserves water in the agro-ecosystems, which are part of the continuum of the forest ecosystem.
5.10 Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	Contributor to agricultural trading and processing industries

6. Beekeeping		
Assessment criteria	**Indicator related questions**	**Assessment**
6.1 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
6.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	Beekeeping is dependent on the conservation of the forest area for the bees to thrive and be productive. SFM is a prerequisite for sustained beekeeping. However, the use of bark hives can offset the positive contribution of beekeeping to the avoidance of forest degradation as the debarked trees will die. The continued application of this method of beekeeping by an increasing number of beekeepers can lead to significant forest degradation.
6.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The reduced availability of other wood forest products to maintain a forest area for optimal production of honey and honey products.
6.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	Beekeeping is to a large extent practised under customary open access lands where the tenure is administered by the chiefs on behalf of the State. However legally the land still belongs to the State. To stimulate sustainable beekeeping practices, the issue of land tenure in open access lands will need to be looked into if the practice is to be used for REDD+ activities.
6.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners?	The majority of beekeepers are rural dwellers who benefit from the beekeeping income-generating activities and, to a certain extent, manage the forest by default to sustain the beekeeping business. The Forestry Department is responsible for the management of the open access forests. Both the beekeepers and Forestry Department are eligible for REDD+. No specific policy exists for beekeeping, but attempts have been made to come up with a beekeeping policy in Zambia.

6. Beekeeping

Assessment criteria	Indicator related questions	Assessment
6.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The leakage risk exists, as restriction for use of the forest for harvesting of other wood products may force non-beekeepers to harvest from other forests.
6.7 Permanence	• Does the practice have the propensity to remain forested or un-degraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	Noting that SFM is the prerequisite for sustained beekeeping, it follows that the practice can make a great contribution to the avoidance of forest degradation and deforestation, thereby contributing to carbon stock and carbon sequestration.
6.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	Beekeeping can be replicated in areas with similar biophysical conditions.
6.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest-dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	It increases the range of products that forest-dependent communities can use for income generation (e.g. honey, beeswax, propolis, honey beer). In addition to contributing to avoiding forest degradation and deforestation, the bees play an important role in pollination in the forest ecosystem, which helps to maintain and enhance biodiversity species. Beekeeping contributes to the water and soil conservation indirectly through its contribution to the avoidance of deforestation and forest degradation.
6.10Compatibility with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	Beekeeping in forests and woodlands has low labour-requirements and supplements a wide range of other livelihood activities (e.g. farming). Sales of honey and beeswax generate significant income to households in the North-Western Province and sustains a thriving local trading and processing industry. In the vicinity of farms and orchards, bees increase yields through pollination. Bees require forage, water and shade. Hence, good woodland conditions, with a healthy and diverse range of species, and adequate cover are needed, which is often not compatible with conventional smallholder and commercial agriculture (unless forest areas are set aside for beekeeping purpose).

7. Community-Based Natural Resource Management (CBNRM)		
Assessment criteria	**Indicator related questions**	**Assessment**
7.1 Biomass and Carbon levels in the ecosystem	• What is the level of the existing biomass in the ecosystem of the forest management practice in discussion?	Inadequate ecosystem-specific data
7.2 Deforestation degradation threat level	• What are the threat levels based on the main drivers of deforestation and degradation in areas where this practice occurs?	The management plans for the GMA`s clearly oblige the managers to manage the areas with minimum disturbance of natural resources, both wildlife and vegetation, with fire management as a core function. However, agriculture is allowed in the GMAs, which contributes to deforestation threat levels.
7.3 Opportunity costs	• What is the cost of forgone benefits as a result of using this practice to avoid deforestation, forest degradation?	The opportunity costs will vary depending on the resources within and outside the GMA. If the community is able to satisfy their forest product needs from areas around the GMA, the opportunity costs remain low, and vice versa.
7.4 Clarity of land tenure	• Is there clarity in the land tenure regime under which the practice is being implemented?	GMAs are governed by the customary land tenure system. Depending on the design of the REDD+ activities to be implemented, land tenure issue would need to be looked into.
7.5 Governance	• What is the degree of people's participation in management and benefit sharing? • Is the practice linked to a national institutional structure that has the potential to successfully administer and govern REDD+ at national level? • Is the practice linked to a national policy/ legislation that has the potential to successfully support the REDD+ desired outputs/outcomes? • Does the practice involve actors that can be eligible for registration as REDD+ partners?	CBNRM evolved and is practiced around the principle of community (men and women) participation in natural resource management and the sharing of the benefits accruing from the protected resources. ZAWA manages the GMAs in collaboration with the communities. Both are eligible under REDD+. The legal provisions for the implementation of CBNRM are in existence and are driving the sustainable management of wildlife in Zambia. However, in terms of sustaining the approach, deficiencies in implementation of the provisions are of concern, especially regarding aspects related to benefit sharing. Community shares are usually disbursed very late, and the current divisions of shares between the community and ZAWA are still contentious

7. Community-Based Natural Resource Management (CBNRM)		
Assessment criteria	**Indicator related questions**	**Assessment**
7.6 Leakage risk	• Is the practice likely to cause direct emissions elsewhere as a result of its being used as a model for REDD+ in a particular place	The approach is likely to cause leakages if further restrictions are imposed on harvesting of wood products from the GMAs.
7.7 Permanence	• Does the practice have the propensity to remain forested or undegraded permanently? • Can the practice slow down deforestation and forest degradation rates over time?	Implementation of management plans that require the maintenance of an optimum level of tree population can slow down the rate of deforestation.
7.8 Replicability	• What is the potential of scaling up the practice to other (similar) areas?	The approach can be replicated in areas of similar biophysical conditions.
7.9 Co-benefits	• Does the practice have the potential to improve the socio-economic welfare of the forest dependent communities? • Does the practice contribute to the conservation of biodiversity? • Does the practice contribute to the maintenance and or enhancement of hydrological and soil conservation services?	Increased income and or community services arising from the income are shared with the community for their participation in natural resource management. The first principle for the establishment of GMAs is to create a buffer for the National Parks to help in the conservation of biodiversity of both plant and animal species. The maintenance of viable populations and communities of both animal and plant species contributes to soil and water conservation. Plant species play a key role in conserving water and protecting soil fertility and quality. Under ideal population densities, animals contribute to maintaining soil fertility.
7.10 Compatibil-ity with other livelihood activities	• Does the practice enhance/conflict with other livelihood activities?	A relatively undisturbed forest will enhance the availability of NWFPs for income generation and household food security.

UN-REDD
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