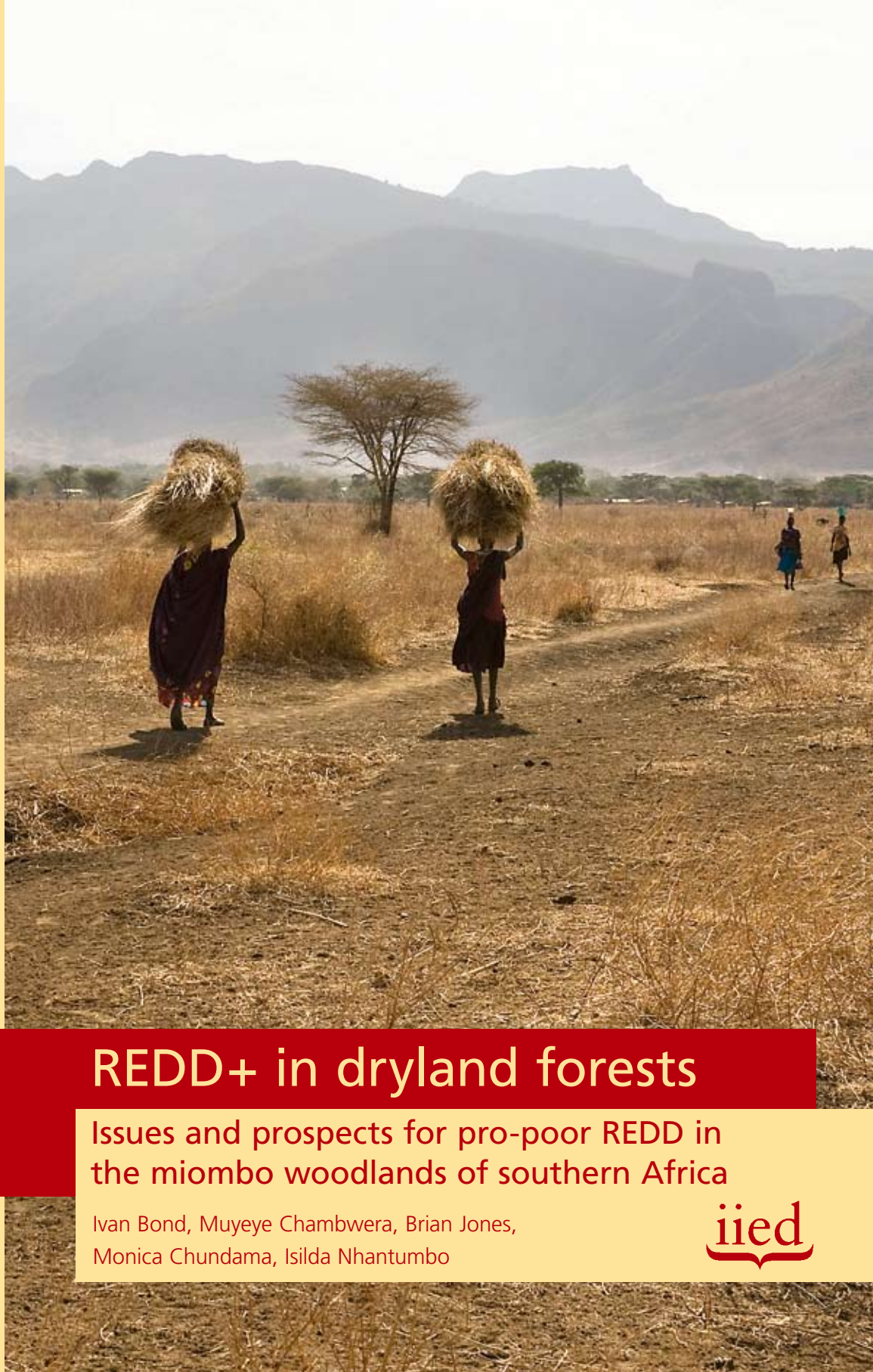

REDD+ in dryland forests

Issues and prospects for pro-poor REDD in the miombo woodlands of southern Africa

Ivan Bond, Muyeye Chambwera, Brian Jones,
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First published by the International Institute for Environment and Development (UK) in 2010

ISBN: 978-1-84369-764-0 ISSN: 1605-1017

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A catalogue record for this book is available from the British Library

Citation: Bond, I., Chambwera, M., Jones, B., Chundama, M. and Nhantumbo, I. (2010) *REDD+ in dryland forests: Issues and prospects for pro-poor REDD in the miombo wooldands of southern Africa*, Natural Resource Issues No. 21. IIED, London.

Design by: Eileen Higgins, email: eileen@eh-design.co.uk
Cover photo: Women from the Karimojong tribe carrying firewood to their village, Uganda © Jorgen Schytte/Still Pictures.
Printed by Park Communications, UK on 100% recycled paper using vegetable oil based ink.

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Acronyms

ADMADE	Administration Management Design
CBC	Community-based conservation
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBNRM	Community-based natural resource management
CITES	Convention on International Trade in Endangered Species
CO_2	Carbon dioxide
DRC	Democratic Republic of Congo
DUAT	Certificate of Land Use and Improvement Rights
ETS	European Emissions Trading Scheme
GHG	Greenhouse gases
GMA	Game Management Area
ha	hectare
ha^{-1}	per hectare
IPCC	Intergovernmental Panel on Climate Change
JFM	Joint Forest Management
LIRDP	Luangwa Integrated Rural Development Project (Zambia)
NACSO	National Association of Conservancy Service Organizations (Namibia)
NTFPs	Non-timber forest products
PEP	Poverty Environment Partnership
REDD	Reduced emissions from deforestation and forest degradation
TA	Traditional Authority
TBNRM	Trans boundary natural resources management
t C ha^{-1}	Tonnes of carbon per hectare
t CO_2	Tonnes of carbon dioxide
UNFCCC	United Nations Framework Convention for Climate Change
WWF	World Wide Fund for Nature
ZAWA	Zambian Wildlife Authority

Acknowledgements

This report draws and builds on the work of three separate studies in Namibia, Mozambique and Zambia. These reports were authored by Brian Jones and Jonathan Barnes (Namibia), Isilda Nhantumbo and Samira Izidine (Mozambique), and Monica Chundama (Zambia). The final document has benefited considerably from the input and insight of Davison Gumbo, James Mayers, Mel Kelly, Peter Dewees, Simon Anstey, Sonja Vermuelen, Casey Ryan, Khanh Tran-Thanh and Maryanne Grieg-Gran, for which the authors are extremely grateful.

The work was funded by the Program on Forests (PROFOR) of the World Bank.

All omissions and inaccuracies in this document are the responsibility of the authors. The views expressed do not necessarily represent those of the institutions involved, nor do they necessarily represent official policies of PROFOR or the World Bank.

Ivan Bond

This report was completed before the sudden death of its lead author, Ivan Bond, in February 2010. Ivan died following surgery for a tumour on his lung.

Between January 2004 and September 2009 he was a much-loved senior researcher at IIED, working on the practicalities of payments for environmental services – on watersheds and latterly on REDD – and a range of other projects. Before IIED he was with WWF in southern Africa, engaged with a wide network of protagonists in community based natural resource management. Ivan joined DFID in September last year and quickly established himself as an innovative and invaluable colleague, working on forest and climate issues. An energetic and enthusiastic man to the last, Ivan could turn his hand to many things – always with great communication and humour. He leaves a wife and two children, and many, many friends.

James Mayers (Series editor)

Executive summary

For two reasons the miombo woodlands of eastern and southern Africa provide an important opportunity for developing pro-poor payments for avoided deforestation and degradation. Firstly, there is strong scientific evidence that the loss of woodlands is associated with a decline in livelihoods. Secondly, there are two decades of successful community-based natural resource management (CBNRM) in the miombo region. This gives the region a ready-built institutional basis on which payments for reduced emissions for deforestation and degradation (REDD+) can be established as well as generating wider lessons for their implementation. Poverty is deeply entrenched across southern Africa and to be successful REDD+ will have to be pro-poor.

To explore the opportunities for pro-poor payments for avoided deforestation and synergies with existing knowledge and experiences provided by CBNRM in the region, IIED facilitated a three-phased research process that involved:

- A broad-based desk review of the links and opportunities between CBNRM and payments for avoided deforestation at a regional level.
- Individual reviews of existing literature as well as in-country stakeholder consultations and workshops in Namibia, Mozambique and Zambia led by country experts.
- A synthesis workshop involving IIED and country experts from Namibia, Zambia and Mozambique.

The purpose of this work is to contribute towards an improved understanding of REDD+ amongst the stakeholders across all sectors in the region especially in the period leading up to and immediately after the meeting of the UNFCCC COP 15 in Copenhagen. This paper uses the term REDD+ as defined in the Bali Action Plan i.e. 'Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.'

At a conceptual level, payments for REDD+ is 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 its implementation. Some of the major methodological and technical issues facing payments for REDD+ are:

- Establishing **baselines** against which payments for reduced deforestation can be made.
- **Monitoring, reporting** and **verifying** the changes in land use.
- Ensuring that the changes made are **permanent**.
- Taking measures to ensure that deforestation is simply not displaced to another location (**leakage**).
- Resolving **legal** and **policy issues** in order to clarify who owns the carbon and who should benefit from its conservation.
- Establishing the **levels of payments** necessary to ensure changes in land use.

Value and complexity of the miombo

The miombo region covers between 2.7 and 3.6 million km^2 in 11 countries of eastern and southern Africa. The region is biologically rich and diverse with around 4,590 plant species confined to this area, together with 35 endemic mammals, 51 endemic birds, 52 endemic reptiles, 25 endemic amphibians and an unknown number of endemic invertebrates.

The management of these important but diverse woodlands is complex. Across the region there are challenges and barriers to their more effective and sustainable use. Biophysically, the soils on which the woodlands grow are inherently infertile, which makes it challenging when managing them for multiple goods and services. The policy environment is made difficult by disabling forestry policy and the general marginalization of the forestry sector. Finally, decades of low economic growth and political insecurity have pushed people towards rapid exploitation of the woodlands.

Approximately 100 million people live in miombo region of whom about 75 million are poor and live in rural areas. To the rural poor, miombo woodlands are a valuable resource. They provide an effective safety net in times of distress and stress. However, many urban residents also use a range of goods the woodlands, such as fuel wood, charcoal, fruit and fungi and there is a steady flow of goods and services between rural and urban areas.

The average annual rate of woodland loss in the miombo region varies between 0.2 per cent and 1.7 per cent a year – although the statistics are weak and do not include degradation. The main reasons for land-use change in the miombo are the conversion of woodland for agriculture and settlement, the extraction of fuel wood to meet household, urban and sometimes industrial purposes, and the extraction of hardwood timber. These changes occur because conversion provides higher short-term benefits to households and communities than conservation. However, it is also very clear that the exploitation of these nutrient-poor woodlands, either for agriculture, timber or non-timber forest products, will not lead to widespread poverty alleviation. Factors such as the development of roads, economic growth points and investments in mining often attract migrants to previously unsettled or sparsely settled areas.

Policy context for community-based natural resources management

While the region is generally facing many challenges, some southern African countries have been at the forefront of innovative policies that devolve the responsibility for the management of land and natural resources to communities.

These policies and legislative frameworks provide the basis for many of the CBNRM programmes in the region. The legislation shares a set of common principles across the countries. It has a strong basis in economic incentives, the

belief in the devolution of land and resource management from government to local levels, and a foundation in collective proprietorship and action.

This study reviews the legal and policy frameworks for the management of land and natural resources in Mozambique, Namibia and Zambia. In Mozambique and Namibia there is substantive progress with legislative frameworks for devolved resource management. In Mozambique, communities can apply for Certificates of Land Use and Improvement Rights (DUATs) that give them substantial control over defined areas of land. In Zambia, progress on devolved land and resource management has been more contested and the most recent legislation has not been implemented. While the changes made to develop CBNRM have been progressive and lay a foundation for REDD+, our analysis notes that:

1. **Policy and legal changes are discrete rather than continuous:** Policy changes are not generally part of a continuous policy cycle in which changes are made, the effects monitored and further policy developed. Changes have been more closely associated with discrete policy windows or opportunities. However, legal and policy changes to allow countries and communities in the miombo region to participate in REDD+ will have to break this pattern and become part of an ongoing policy reform process.

2. **Policy and legal changes are generally sector-specific:** Changes have little consideration of cross-sectoral interactions. The reduction in deforestation will require legal and policy changes that are coherent and coordinated across relevant sectors especially land, agriculture, infrastructure and energy.

3. **There is a broad trend towards devolved resource management:** However, there have also been indications of re-centralisation of policy for the management of resources in the region. If payments are to be made to reduce deforestation these will need to accrue directly to resource and land managers and will need to take place in a framework that empowers resource managers at an appropriate local scale.

4. **There is growing acceptance of markets in the management of natural resources:** The last two decades of CBNRM policy change and support in the region have largely been based on a growing acceptance that markets can and do have a fundamental role to play in the management of natural resources. This means that there is unlikely to be any major philosophical resistance to the principle of payments for REDD+ in the region.

The major challenge will be the lack of clarity over land tenure, which could lead to conflict over the ownership of land, woodland resources and possibly carbon rights.

Costs of REDD+

The reasoning behind REDD+ is that forests are 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. The costs of REDD+ fall into three main categories: the opportunity costs, the transaction costs and the implementation costs.

The key cost is the opportunity cost of land. In the miombo region, land is generally cleared for settlement, agriculture and fuel wood. The construction or improvement of roads, and the development of settlements and agricultural policies are all indirect drivers of deforestation. To change the behaviour of farmers, REDD+ benefits will have to match or exceed the benefits from other land uses that have been given up for conservation.

Based on limited data, our analyses show that the price of carbon that would make REDD+ attractive in the three countries reviewed varies between $2.49 and $3.71 per tonne of carbon dioxide equivalent. In countries where multiple benefits are enjoyed from forest conversion, the opportunity costs are higher, as in Zambia where woodlands are used for timber, charcoal and agriculture. On the other hand, the opportunity cost of REDD+ in the miombo forests of the Caprivi Strip of Namibia is very low where woodlands are not used to provide charcoal or timber.

In a single year, 73,400 ha, 217,000 ha and 445,000 ha of woodlands are lost every year in Namibia, Mozambique and Zambia respectively. As a rough guide, the elimination of deforestation in any one year could supply about 3.3 million, 9.8 million and 26.8 million tonnes of carbon respectively at prices of carbon equivalent to the opportunity costs and implementation costs in these countries by avoiding the loss of these forests. The countries could each earn revenues of $8 million, $25 million and $99 million respectively. This compensates them for benefits that they could have derived from converting these forests to other uses over 30 years.

The revenues accruing to countries from participating in REDD+ depend on the value of carbon loss avoided per unit of forest, the extent to which deforestation can be reduced and the price of carbon paid. At carbon prices below the costs of REDD+ in a country, the country would incur costs, or may not be able to effectively prevent deforestation.

A challenge in the miombo is estimating implementation and transaction costs. As lessons from CBNRM show, the process of developing and implementing incentive-based schemes involving communities and multiple forest and land uses is often too complex and iterative for one to be able to predict with certainty how much the process costs.

What REDD+ could learn from CBNRM

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, we have identified the following implementation lessons:

1. 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.
2. The implementation of REDD+ should build on the partnership models between government, communities and non-governmental organizations that have evolved under CBNRM.
3. Benefiting communities must be allowed a high degree of autonomy in how financial benefits are used and shared.
4. The implementation of REDD+ should be innovative and flexible and adapted to local circumstances.
5. Most of the miombo region is considered as communal land. REDD+ implementation should be based on the solid theoretical foundations of common property theory.
6. REDD+ will need to develop viable, cost-effective and sustainable community-based monitoring systems to complement more technical options such as remote sensing.
7. Pilot REDD+ initiatives in the miombo region need to inform and be informed by national and international practice.
8. CBNRM programmes stimulated the development of a cadre of multi-disciplinary 'scholar-practitioners'. REDD+ programmes need to build on this foundation by investing in tertiary education at undergraduate and postgraduate levels.
9. Community-based organizations for the management of land and natural resources are more effective when there is the clear separation of executive and representative functions.

As well as the direct lessons that can be transferred from CBNRM to REDD+ there is considerable community architecture developed by CBNRM programmes upon which REDD+ can build rather than developing a parallel infrastructure.

Making REDD+ pro-poor

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

Based on our review and analysis we propose that pro-poor REDD+ will only have long-term success in reducing the rates of deforestation if:

1. Rights to land, resources and carbon are clarified and reside with farmers and communities.
2. There are legal and policy frameworks in place that value and reward land uses other than agriculture.
3. Payments made exceed the benefits that would accrue to farmers from alternative land uses including agriculture; timber and energy (charcoal).
4. Implementation allows communities, local government and supporting organizations to adapt activities to meet local conditions.
5. Implementation recognizes the potentially severe impacts of climate change on ecosystems agriculture and livelihoods in the region.
6. Underlying governance challenges that exist at all levels are addressed.

We acknowledge that the challenges and trade-offs involved in making pro-poor REDD+ a success in the miombo region are enormously complicated. Pilot REDD+ projects and programmes should start by setting a minimum standard of 'doing no harm' with respect to poverty.

Introduction

The growing levels of carbon dioxide (CO_2) and other greenhouse gases (GHG) in the atmosphere are now directly and unequivocally linked with changes to the global climate (IPCC, 2007). Eleven of the 12 years between 1995 and 2006 have been the hottest since the start of instrumental record keeping began in 1850; the results of climate change are evident in glacial melts, increase in extreme events and changing weather patterns (IPCC, 2007).

There are both natural and anthropogenic sources of GHG. Of the anthropogenic sources the conversion of natural forests and woodlands, particularly in the tropics, is estimated to account for 17–18 per cent of total annual GHG production (IPCC, 2007). Recent analyses reviews indicate that it will not be possible to keep to temperature increases to below 2 ^{o}C without addressing GHG produced from land-use change (Eliasch, 2008).

Measures to address GHG emissions from land-use change were deliberately excluded from the Kyoto Protocol for both technical and political reasons (Fearnside, 2001; Laurence, 2007). However, the growing awareness of the urgency of climate change, the appreciation that GHG from land-use change had to be addressed if warming was to be kept below 2 ^{o}C, and the likely costs of such action have led to renewed interest in the options for their inclusion in a post-Kyoto Agreement.

The most likely option is that industrialized countries will make payments to countries with forests and woodlands specifically for reducing their emissions from deforestation and degradation (REDD+). Payments for avoided deforestation are conceptually simple – rich developed countries will pay poorer, less developed tropical countries for the conservation of standing forest. The effective implementation of these measures that ensures a real reduction in deforestation and therefore the emissions of greenhouse gases are significantly more challenging. Amongst the most difficult issues are: the determination of the baseline against which reductions are measured; whether the avoided deforestation is permanent; and how to avoid simply displacing deforestation from one location to another (Angelsen *et al.*, 2008). The cost of reducing deforestation by 50 per cent is estimated to be between US$17 billion and US$33 billion per annum (Elaisch, 2008).

The focus of deforestation has tended to be on those major tropical forest nations where there is the greatest rate of gross deforestation such as Indonesia and Brazil. There is substantially less attention paid to the dryland forests and woodlands where the per unit area of carbon stocks are lower than topical forests. One such biome is the miombo woodlands that cover between 2.7 and 3.6 million km^2 of eastern and southern Africa. The woodlands extend

into 11 countries. Although they are the dominant ecosystem in the region, it is important to note that they are not the only ecosystem in the region. The majority of the residents of these 11 countries are poor and about 75 per cent of them live in the rural areas. Typically they are small-scale farmers who use goods and services produced by miombo woodlands (Campbell *et al.*, 2007).

Miombo woodlands are being cleared at a significant rate, driven by the need for land for settlement, agriculture and energy (wood-fuel and charcoal). The development of infrastructure, particularly roads and the provision of water, are major contributing factors. There are no estimates of total GHG emissions from deforestation and degradation of miombo woodlands themselves. At a global scale the total land-based emissions from the miombo countries are relatively small compared with the massive GHG emissions from the major tropical forest countries such as Brazil, Indonesia and Nigeria).[1] The highest estimate for the miombo region is for Zambia, where deforestation and degradation across the whole country is estimated to contribute 3 per cent to total GHG production from deforestation (EIA, 2008).

Although many countries in eastern and southern Africa have faced seemingly intractable barriers to economic and social development, several have been at the forefront of innovations for the management land and natural resources by communities. Collectively these programmes are often referred to as community-based natural resource management (CBNRM) programmes (Hulme and Murphree, 2001; Child, 2004; Roe *et al.*, 2009). At a very basic level, these programmes have sought to turn wildlife and wildlife habitat into an asset for rural farmers by granting them varying degrees of user rights. Although the implementation and the performance of these programmes vary widely, they do provide the international community with some important lessons on the development of incentives for land-use management.

1.1 Objectives

This report uses the experiences of three southern African countries (Mozambique, Namibia and Zambia) to investigate the options and the potential synergy between CBNRM programmes and potential climate mitigation options that might develop under international REDD+ schemes. The overall purpose of the report is to examine the CBNRM experience to assess the prospects for REDD+ schemes in the region that are pro-poor. To do this the report examines the legal and policy frameworks that allowed wildlife-based CBNRM to develop, the opportunity costs of land use in the region and some of the broad lessons that have been learned from the implementation of current CBNRM programmes.

1. The top ten emitters of GHG from deforestation and forest degradation are: Brazil (25 per cent); Indonesia (23 per cent); Nigeria (6 per cent); DRC (4 per cent); Burma (4 per cent); Zambia (3 per cent); Cameroon (3 per cent); Philippines (2 per cent); Venezuela (2 per cent) and Bolivia (2 per cent). Source: http://www.eia-global.org/PDF/EIA_REDDPoznanBriefing.pdf

Photo: Muyeye Chambwera

Deriving livelihoods from the miombo: small-scale cultivation and fuelwood collection

1.2 Methodological approach

This report is a product of a project that was developed in three phases (see below) and with two overriding methodological approaches. In reviewing the CBNRM experience the project focused on understanding the legal and policy frameworks that allowed the development of large-scale CBNRM programmes and the lessons that could be transferred to future REDD+ schemes in the region. The second approach was to analyse the opportunity costs of land use in the region on the basis that the conversion of land for agriculture and settlement is one of the major driving forces of deforestation in the region.

The four background reports, this synthesis and analysis are derived from current literature and the experiences of the authors. No new fieldwork has been undertaken. However, it must be emphasized that the CBNRM programmes in the region have been developed over a 15–20 year timeframe, cover a large geographical area, and involve significant numbers of households. A vast body of multi-disciplinary research has been evolved from these CBNRM programmes upon which this project draws extensively.

Phase one: A broad-based desk review of the links and opportunities between CBNRM and payments for avoided deforestation at a regional level.

Phase two: Individual reviews in Namibia, Mozambique and Zambia with a focus on:

- the economic drivers of deforestation in the country
- how the existing legal and policy framework could support REDD+
- the opportunity costs of land uses
- proposals for the institutional arrangements for REDD+

Phase three: Using the case studies, IIED and the country partners used a facilitated workshop to:

- Identify and consolidate the lessons that could be learned from REDD+.
- Prepare a regional supply curve for REDD+.
- Outline a set of options to ensure that future REDD+ payments are pro-poor.

1.3 The structure of this report

This report is divided into six chapters. Chapter 1 has provided a brief outline of the region and the methodology for the study. Chapter 2 looks in more detail at the miombo woodlands of eastern and southern Africa including the drivers of deforestation, the challenges of managing miombo woodlands and the issue of climate change. Chapter 3 reviews the current legal and policy framework for the management of land and natural resources in Namibia, Mozambique and Zambia. The second part of Chapter 3 uses a framework to assess the applicability of the legal architecture for REDD+. In Chapter 4 the analysis uses the opportunity costs of land use to derive an initial supply curve for REDD+ in the miombo woodlands. Chapter Five reviews some of the key lessons from CBNRM that are applicable to potential REDD+ schemes in the region. Chapter 6 seeks to bring the narrative together and makes recommendations of how REDD+ can be made pro-poor in the miombo region.

Background to the miombo woodlands of eastern and southern Africa

2.1 Introduction

The miombo region is a large area of savannah woodland and associated wetlands in southern and eastern Africa.[2] It covers between 2.7 and 3.6 million km^2 in the following 11 countries: Angola, Botswana, Burundi, Democratic Republic of Congo (DRC), Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe (Figure 1). Although it is the dominant vegetation in the region it is by no means the only ecosystem, nor is it equally distributed across the 11 countries.

The defining characteristics of the miombo are:

- The system grows on ancient rock formations that have been geological stable for hundreds of millions of years.
- There is a long dry season over the cooler part of the year, lasting up to nine months in some areas.
- Erosion over millions of years has resulted in a flat topography where the drainage is generally sluggish. The soils of the region are ancient and tend to be nutrient poor.
- Because of the ancient nature of the landscape and the low nutrient status of the soils there are relatively few specialist herbivorous species but rather bulk vegetation feeders such as elephants.
- Finally, the system is subjected to frequent fires during the dry season and these fires have become more frequent over the past thousands of years because man has set them to assist hunting and farming.

2. Miombo woodland is characterized by three *Caesalpinoid* genera: *Brachystegia, Julbernadia* and *Isoberlina*. Generally these species all produce hard timber and many have a fibrous tannin rich bark (Campbell *et al*., 2007).

Figure 1. The distribution of miombo woodlands in eastern and southern Africa

Source: Desanker *et al.* (1997) in Chundama (2009)[3]

In terms of species values, there are around 4,590 plants in this area, together with 35 endemic mammals, 51 endemic birds, 52 endemic reptiles, 25 endemic amphibians and an unknown number of endemic invertebrates. But the most important biological feature of the area is the wide variety and large numbers of large mammalian herbivores[4] and large predators[5] (Chidumayo *et al.*, 1996).

3. Figure 1 does not show the Caprivi Strip of Namibia as being part of the miombo woodlands, despite it having the miombo characteristics discussed above. As with most maps of the miombo, this could be because the miombo woodlands are not predominant in Namibia.
4. Elephant, white and black rhino, hippo, giraffe, zebra, buffalo and numerous antelope.
5. Lion, cheetah, leopard, hyaena, wild dog.

Approximately 100 million people live in miombo region. Of this total, it is estimated that 75 million are living in rural areas and the balance of 25 million in urban areas (Campbell *et al.*, 2007). However, there is considerable movement of people, goods and services between rural and urban areas in response to climatic, economic and political factors (Drinkwater, 1991; Bond, 1996).

An important political characteristic of the region is the high degree of conflict, both currently and in the recent past. Major independence wars were fought in Angola, Mozambique and Zimbabwe; Angola, Mozambique, the DRC and Zimbabwe have all experienced substantive armed conflicts after independence from colonial rule. Within the region, the DRC remains highly unstable while political uncertainty and economic contraction characterizes Zimbabwe.[6]

Poverty is endemic and deeply intractable in the six countries that constitute the bulk of the miombo region (see Table 1). Based on per capita national income these countries are ranked between 125 (Angola) and 203 (Malawi) of the poorest nations in the world. The situation is compounded by significant inequities in income distribution with three out of the five countries having Gini-coefficients greater than 0.5 (Table 1). Outside of Zimbabwe, however, many of these countries have experienced above-average economic growth in the recent past (see Table 1), but there is evidence that, despite this, rural poverty in particular is not being reduced or alleviated at any significant scale (Campbell *et al.*, 2007). All except Angola are dependent on imported oil while most depend on exports of primary commodities. The economies are therefore extremely vulnerable to the current fluctuations in oil and commodity prices (Mati, 2008; World Bank, 2008).

Table 1. Summary of selected economic and social indicators from the countries in which miombo woodland is the dominant vegetation type

	Selected social and economic indicators				
Country	Gross national income (2005)	Economic growth rates	Life expectancy at birth	Income distribution (Gini coefficient)[7]	Ranking[8]
Angola	1,410	21	41	not available	125
Malawi	160	3	41	0.503	203
Mozambique	310	8	42	0.396	195
Tanzania	340	7	46	0.382	187
Zambia	500	5	38	0.526	169
Zimbabwe	350	- 6	37	0.568	191

Source: Derived from Campbell *et al.* (2007)

6. Deep political uncertainty and hyper-inflation are currently being experienced in Zimbabwe and are strong contributing factors to the shrinking economy (see Table 1) and the very low life expectancy at birth figures.
7. See:http://www.scribd.com/doc/328232/United-Nations-Gini-Coefficient
8. Rankings are on the basis of the World Bank's Gross National Income per Capita (Atlas Method) based on 2007 data. Source: http://web.worldbank.org/WEBSITE/EXTERNAL /DATASTATISTICS

2.2 The drivers of deforestation and degradation in the miombo woodlands

Accurate statistics on the rate and extent of deforestation and woodland degradation of miombo are not available at the ecosystem, regional or national levels (Campbell *et al.*, 2007). The most recent national estimates available show the rates of national deforestation to be between 0.2 per cent in Angola and 1.7 per cent in Zimbabwe (see Table 2). There is considerable variation both within and between countries (Campbell *et al.*, 2007). In real terms this means that annual loss of woodlands varies between about 445,000 ha per annum in Tanzania and 33,000 ha in Malawi, which is an already highly deforested landscape. It is estimated that overall approximately 1.4 million ha of woodland are lost annually in the countries where miombo woodlands dominate (Campbell *et al.*, 2007).

For many people, the loss of woodlands and the goods and services that they provide reduces their livelihood options, especially in times of stress (Campbell *et al.*, 2007). This is particularly important in a region in which the elimination of poverty is proving to be intractable and where climate change is likely to increase the frequency and severity of extreme climatic events (Campbell, 2009). Finally, many of the soils in the miombo region are very fragile and highly susceptible to erosion when the natural vegetation is removed. The loss of top soil from sheet erosion has long-term negative impacts on agricultural production as well as leading to siltation of rivers and dams (Campbell *et al.*, 1989).

The drivers of land-use change vary markedly between the countries in the region depending largely on location, physical access, topography rates of economic growth, and land tenure. There are three core or common reasons for land-use change (Campbell *et al.*, 2007), which are:

- the conversion of woodland for agriculture and settlement;
- the extraction of fuel wood to meet household, urban and sometimes industrial purposes;
- hardwood timber extraction.

These processes can often reinforce each other and are often aided by the development of mines, urban settlements or the upgrading or the development of new roads. New settlements, such as mines or government-designated growth points that attract significant numbers of people become centres of demand for firewood and charcoal. On the other hand, better and new roads allow access into previously inaccessible areas and reduce transport costs of charcoal, fuel wood and agricultural products.

Photo: Muyeye Chambwera

Clearing forests for cultivation, Mozambique

At the macro-level, the density of trees per hectare varies considerably across the miombo region (Frost, 1996).[9] At this level there is often a gradation from high to low woody biomass along the soil catena that typifies the miombo woodlands. This variability makes it very difficult to differentiate between deforestation and degradation in miombo woodlands.[10]

The problem is further exacerbated by the way in which people use the woodlands. Significant modification or deforestation of the standing vegetation normally occurs for settlement and cultivation. At low rates of extraction, the collection and harvest of timber, fuel wood and building materials can be sustainable, albeit leading to the loss of stem carbon, i.e degradation. However, continuous extraction of timber can easily lead from degradation into a state of deforestation. For grammatical purposes this report refers mostly to deforestation, but acknowledges that in miombo ecosystems it can be difficult to differentiate between the two. More importantly, degradation is a process that can, with time, lead to effective deforestation across large areas of miombo woodland.

9. Crown cover in miombo woodlands can vary between 20 per cent and 60 per cent (Walker and Desanker, 2004).

10. Technically deforestation only occurs when there is human-induced loss in crown cover from above to below a nationally defined threshold. Degradation on the other hand is defined as direct and long-lasting loss of forest carbon stocks that does not qualify as degradation (GOFC-GOLD, 2009).

Table 2. Rates of land-use change in countries in which miombo woodland is the dominant vegetation type

Country	Total forest area (2005)	Annual rates of change			
		1990-2000		2000–2005	
		Area (1,000 ha)	% change	Area (1,000 ha)	% change
Angola	59,104	-125	- 0.2	-125	- 0.2
Malawi	3,402	-33	- 0.9	-33	- 0.9
Mozambique	19,262	-50	- 0.3	-50	- 0.3
Tanzania	35,257	- 412	- 1.0	- 412	- 1.1
Zambia	42,452	- 445	- 0.9	- 445	- 1.0
Zimbabwe	17,540	-313	- 1.5	- 313	- 1.7

Source: FAO (2007) quoted in Campbell *et al.* (2007)[11]

2.3 The challenges of managing miombo woodlands

Miombo woodlands are a valuable resource to poor households; they provide an effective safety net to poor households in times of distress and stress. It is also very clear that the exploitation of these nutrient-poor woodlands, whether for agriculture, timber or non-timber forest products, will not lead to widespread poverty alleviation (Campbell *et al.*, 2007).

However, the management of these important but diverse woodlands is complex. Eight barriers to the more effective and sustainable use of miombo woodlands have been identified (Campbell *et al.*, 2007). These are divided into four categories; biophysical, policy, economic and organizational. These barriers highlight the very real, linked and often multifaceted challenges faced by countries in the miombo region.

It is important to note that at least four of the eight challenges listed below are nominally 'governance' issues. These are not insurmountable and can be overcome where there is collective will and concerted effort by government and civil society, with the support of international donors. However, the elimination of poverty in the region will only be possible through the substantial structural changes that address conflict, allow countries to break out of the resource trap, reduce their dependency on 'bad neighbours' and address the chronic governance failures that beset many of the countries in the region (Collier, 2007).

One of the key and overriding governance issues that impacts on several of the barriers is derived directly from the colonial legacy of state control of land and natural resources in the region. During colonization, newly formed states effectively seized control over land and natural resources. People living on the

11. Campbell *et al.* (2007) note that the similarity between the figures leads to legitimate concern about their reliability.

land were alienated from key resources and transgressors were criminalized (Hulme and Murphree, 2001). While ordinary people were prevented from using key resources, central governments benefited from the sale of rights to wildlife and timber (Hulme and Murphree 2001; Child, 2004; Fabricius *et al.*, 2004).

There have been significant changes in the role of the state in the last 20 years, particularly in terms of the management of wildlife resources and more latterly timber – much of this has been conducted under the rubric of community-based conservation (CBC) or community-based natural resource management (CBNRM). However, these changes have generally not been implemented evenly across the region or within countries. Chapter 3 of this report reviews the changes in land and natural resource legislation in Namibia, Mozambique and Zambia and assesses them with respect to possible payments for REDD+.

2.4 Climate change and REDD+

There is an unequivocal link between anthropogenic sources of GHG and climate change (IPCC, 2007). Global climate change is being expressed through an increase in recorded temperatures, changes in rainfall, glacial melt and an increase in the incidence of extreme climatic events (IPCC, 2007). Most analyses refer to seven sources[12] of GHG, of which emissions from the conversion of forests and woodlands to agriculture and other uses typically accounts for 17 per cent to 20 per cent of total emissions. Carbon dioxide and other GHG are released as a result of the destruction of the wood (stem and root) and from the changes in composition of the soil (Alvarado and Wertz-Kanounnikoff, 2007).

For technical and political reasons GHG emissions from land-use change were deliberately omitted from the Kyoto Protocol and the European Emissions Trading Scheme (ETS) (Fearnside, 2001; Laurance, 2007). The Bali Road Map developed in December 2007 laid out a process for the introduction of emissions from deforestation and forest degradation into the post-Kyoto Treaty. The inclusion of GHG emissions from deforestation and forest/woodland degradation was supported by recent reviews and analyses showing that it is not possible to effectively mitigate GHG production without addressing land-use change (Stern, 2007) and that conservation of forests was an extremely cost-effective mitigation measure (Eliasch, 2008).

The reasoning behind REDD+ is that forests are converted to other uses, primarily agriculture, because it makes economic sense to the land managers and users, i.e. the returns from converted landscape exceed the returns from the natural forest or woodland. The solution that is encompassed in REDD+ is that individuals, communities, and local and national governments must be rewarded for conserving forests (Angelsen and Atmadja, 2008).

12. Power generation (25.9 per cent); transport 13.1 per cent); industry (19.4 per cent); agriculture (13.1 per cent); buildings (7.9 per cent) and waste (2.85 per cent) (IPCC, 2007).

Table 3. Summary of the barriers to managing miombo woodlands

Category	Barriers	Comment
Biophysical barriers	1. Low inherent productivity.	Growth rates of miombo woodlands are poor because they are found on old and highly leached soils. Regeneration of degraded or abandoned locations is slow.
	2. Managing for multiple products.	Miombo woodlands are diverse and also produce a diverse range of products from wildlife to non-timber forest products (NTFPs). Managing these systems for diverse products requires an understanding of the trade-offs that exist.
Policy barriers	3. Disenabling forestry policy.	Despite devolutionary trends across the region, forest policy and legislation still tends to be biased in favour of protection and raising revenue for the state. This undercuts the legitimate role of local resource users. There is also a substantial gap between some of the very good policy and implementation in rural areas.
	4. Marginalization of the forestry sector.	Typically, forestry is a marginalized sector within the governments of the eastern and southern African region. Forestry departments are massively constrained in terms of their mandates and often lack the capacity to implement good policies and legislation.
Economic barriers	5. Cash constraints pushing (people) towards high preferences for rapid exploitation.	The absolute income for most households in the miombo region is very low. Recent research has shown that households apply very high discount rates to the future, which suggests that immediate consumption is often a preference. Market-led economic reforms have exacerbated the situation.
	6. Low margins and high transaction costs.	There are appropriate management strategies for miombo woodlands but these all require financial resources. Because of the low rates of growth the marginal return on management activities is low compared to the relatively high transaction costs of implementing them.
Organisational barriers	7. Weak local organizations.	Much of the existing miombo woodland exists on communal land. Organizations and the institutions for the management of land and natural resources tend to be weak. There is often conflict between modern political and traditional management authorities. While technically miombo woodlands are under common pool management this often tends to be weak or absent.
	8. Weak national forestry organizations.	Because of their low budgets and national status, forestry departments are weak and under-resourced. They are not well adapted to their changing role from forest protectors (by force if necessary) to working with and developing local community capacity for management.

Source: Adapted from Campbell *et al.* (2007)

At a conceptual level, payments for reduced deforestation is a simple and elegant solution to changes in land use (Angelsen and Atmadja, 2008). However, there are numerous challenges and problems to be overcome in its implementation. The major issues facing the payments for REDD+ are:

- Establishing **baselines** against which payments for reduced deforestation can be made.
- **Monitoring, reporting** and **verifying** the changes in land use.
- Ensuring that the changes made are **permanent**.
- Taking measures to ensure that deforestation is simply not displaced to another location (**leakage**).
- Resolving **legal** and **policy issues** in order to clarify who owns the carbon and who should benefit from its conservation.
- Establishing the **levels of payments** necessary to ensure changes in land use.

Each of these questions and many others are the subject of considerable and ongoing research generating numerous innovative solutions and proposals. At the international level many of these issues will only be resolved through climate change negotiations at COP 15 and beyond. At this level resolution and agreement is necessary to stimulate the international financing necessary to reduce levels of deforestation. However, there are already numerous projects, programmes and activities that are supporting efforts to reduce deforestation. Some of these are being financed through the voluntary carbon market, others through bilateral development assistance and private sector agreements. In addition, some developing countries are meeting the costs of reducing deforestation themselves, such as Brazil.

In the miombo region, the most advanced example to date is that of the Nhambita Carbon Project in Sofala Province, Mozambique, where farmers are being rewarded for individual field-level activities as well as communal efforts to manage and avoid deforestation and degradation of 35,000 ha of miombo woodland (see http://www.envirotrade.co.uk/html/projects_gorongosa.php).

2.5 Carbon stocks and climate change in the miombo region

The lack of information on carbon cycles and the impacts of the frequent disturbances from fire and human use of miombo woodlands is a major constraint to the development of optimal management approaches (Williams *et al.*, 2008).

The most recent and detailed investigation of carbon stocks and the effect of agriculture and fire was undertaken as part of the Nhambita Carbon Project, Sofala Province, Mozambique (see Williams *et al.*, 2008). The study area has a mean annual rainfall of 690 mm (ranging from 407 mm to 1219 mm), placing it at the dry end of the continuum of vegetation types that constitute miombo woodlands (Williams *et al.*, 2008).

The analysis of soil and stem carbon in the Nhambita area showed that:

- The estimated stem wood carbon stock was 19.0 (+/- 8) tonnes of carbone per hectare (t C ha^{-1}).
- The estimated median soil carbon stock for undisturbed woodland soils was 57.9 t C ha^{-1}.
- The estimated median soil carbon on land that had been cultivated was 44.9 t C ha^{--1} (implied loss of 13 t C ha^{-1}).[13]
- Stocks of stem wood carbon recovered at 0.7 t C ha^{-1} per annum on land that had been abandoned for agriculture.
- There was no discernable increase in soil carbon on lands that had been abandoned for agriculture.

Photo: Muyeye Chambwera

Carbon stocks of the miombo

The study of soil and stem carbon in the miombo woodlands of Nhambita has some important implications for the management of carbon in the wider miombo woodlands.[14] Firstly, it demonstrates the variability, especially of soil carbon, even

13. Although it is important to note that there was no statistical difference between the woodland and cultivated soils (Williams *et al.*, 2008).
14. These figures do not include the root carbon which has been estimated at ~8 t C ha^{-1} (Ryan, 2009).

within a small geographical area.[15] Secondly, the figures provide some broad estimates of the loss of carbon from the conversion of woodlands to agriculture. For example, the loss of soil carbon is about ~13 t C ha-$^{-1}$ and stem carbon about ~19 t C ha^{-1}. This emphasises the importance of measuring carbon stocks and understanding the carbon cycles before designing management strategies in highly variable environments (Williams *et al.*, 2008).

Potential climate changes and their impact are poorly understood at the sub-regional level in Africa. This is because of limited models, computing capacity, facilities, human skills and a unique set of biophysical variables (such as atmospheric dust) (Boko *et al.*, 2007). Notwithstanding these constraints there is a high level of certainty that sub-Saharan Africa is extremely vulnerable to climate change, agriculture and food production will be compromised, and water stress will increase (Boko *et al.*, 2007).

From the 11 countries in the miombo region, Tanzania, Mozambique, Zimbabwe, southern Zambia, northern Namibia and southern Angola lie in an arc that delineates the area that will experience the highest expected impacts of climate change. Some predictions indicate a 3 ^{o}C to 7 ^{o}C increase in temperature by 2080–2099 compared with 1980–1999, while there will be up to 30 per cent less rainfall (Boko *et al.*, 2007). For all the countries in the region this has serious implications. Agriculture is generally the most important economic activity, principally because it is the source of most household income. The predicted scale of the changes will have a devastating impact on agricultural production systems that are already struggling to meet household needs and provide the engine of growth that the region so badly needs. Over the next century, it means that both adaptation to climate change and mitigation of GHG-producing activities will be necessary.

2.6 Summary

The miombo woodlands of eastern and southern Africa lie on an ancient and highly eroded landscape. The woodlands themselves are biologically diverse and home to a unique flora and mega-fauna. Many of the people who live in the region are poor and poverty alleviation has proved a generally intractable problem. Miombo woodlands, like many other ecosystems, are converted to other uses because they provide higher short-term benefits than conservation. Deforestation in the region is facilitated by the construction of infrastructure, conflicting government policies and poor economic performance.

The conversion of miombo woodlands contributes to GHGs that are causing climate change. The net loss of carbon from miombo is poorly understood due the paucity of research on the carbon cycle and limited numbers of field experiments. However, several countries with extensive areas of miombo

15. The above ground estimates for stem wood carbon can be compared with the average of ~26 t C ha^{-1} for average dry miombo across Zambia and Zimbabwe (Frost, 1996).

woodlands lie in the arc that delineates the region in which climate change is expected to have the highest impact. Predictions for this arc are that temperatures will increase by 3 ^{o}C to 7 ^{o}C and rainfall might decrease by up to 30 per cent (IPCC, 2007). This means that areas currently suitable for mixed agriculture will become semi-arid, suitable for extensive livestock and possibly wildlife production. This will have significant impacts on total livelihoods and the resilience of people to climate-based shocks. To address the twin problems the region will need coherent strategies that deal with deforestation but that will also allow adaptation to an environment that is most likely both hotter and drier.

3

A review of the current legal and policy analysis for the management of land and natural resources

3.1 Introduction

Chapter 2 briefly touched on the management challenges that are facing the miombo woodlands. The analysis noted that one of the problems was that governments continue to hold onto the legal ownership and the management of the land and many of the natural resources of the communal areas of eastern and southern Africa (Table 3). While this is broadly true, some southern African countries have been at the forefront of the development of innovative policies that devolves responsibility for the management of land and natural resources to communities (Roe *et al*., 2009). To a large extent these changes have been stimulated by the wildlife sector as a result of their overt concern for future of wildlife habitat and wildlife management outside of protected areas (Child, 2004).

These policies and legislation provide the basis for many of the CBNRM programmes in the region. The legislation shares some common principles across the countries. It has a strong basis in economic instrumentalism, the devolution of management and collective proprietorship. There is also an over-arching premise of adaptive management, both for resource management and in terms of policy development (Jones and Murphree, 2001).

This chapter of our report reviews the status of key elements of the existing policy and legislative framework for the management of land and natural resources by communities in Mozambique, Namibia and Zambia. From this follows an analysis of whether the current legal and policy frameworks are appropriate for implementation of REDD+ in the region. The review of the status and the applicability of the legal frameworks provide us with some insight into the challenges that will need to be addressed for the large-scale successful implementation of REDD+.

3.2 Changing legislation and policy in Mozambique, Namibia and Zambia

The three countries in the sample have very different economic, social and political histories. Each was a colony, albeit of a different power.[16] In each case, however, the colonial governments effectively alienated the rural majority by passing legislation that controlled both land and the use of natural resources

16. Mozambique was a Portuguese colony; Namibia a German colony and then a South African protectorate while Zambia was a British colony and briefly part of the Federation of Rhodesia and Nyasaland.

(Fabricius *et al.*, 2004; Murphree and Taylor, 2009). The legislation typically restricted access by rural residents to natural resources, especially where it had a commercial value such as timber and wildlife. People who broke the law and were caught were treated as criminals.

In all three countries legislative reform has been fairly recent. In Mozambique and Namibia, legal and policy reforms can largely be attributed to changes in government. In Mozambique the change was from a Marxist-socialist state to a multi-party democracy and market-based economy (Nhantumbo and Izidine, 2009). In Namibia, the stimulus was largely as a result of the country gaining independence (Jones and Murphree, 2001). In Zambia, there was external pressure for the change in the legislation controlling land and natural resources (Chundama, 2009).

While wholesale changes in governance have been important, legal and policy reform was also given impetus by the convergence of several additional factors. These were the emergence of the international sustainable development agenda and the principles of decentralization, changes in the development discourse, the growing influence of market forces, and the a stronger understanding of conservation biology that highlighted the dangers is spatially isolated protected areas (Adams and Hulme, 2001).

3.3 Current status of land and resource legislation

To synthesize and compare legislation and policy across the three countries this review uses a framework that considers land tenure; natural resource tenure; the allocation of benefits; political vs. traditional rights; and the cross-sectoral policy linkages (Table 4) (Jones and Barnes, 2009).

Despite recent legal changes to the status of natural resources such as wildlife and timber, communal land across the three countries is still held in trust by the state on behalf of communities and communal land residents. Mozambique has progressed the furthest of the three countries by developing a mechanism by which communities can gain secure and collective tenure over their land through the DUAT[17] (Nhantumbo and Izidine, 2009; Norfolk, 2004). Crucially, the legislation allows a community to define itself rather than being bound by existing cadastral boundaries, which provides a solid foundation for the development of common property regimes in the future. Communities with a DUAT can enter into agreements with commercial companies, government etc. To date approximately 120 communities have been able to formally define themselves through the DUAT mechanism, although this is a 'drop in the ocean' compared with the total rural population (Nhantumbo and Izidine, 2009).

17. The DUAT is a Land Use and Management Certificate that is awarded to communities. It provides legal protections of occupancy rights for communities who have been occupying land on the basis of customary norms and/or for at least ten years. Further private sector enterprises must consult and pay rent to communities if they wish to use land registered by communities.

Table 4. Review of current CBNRM specific and relevant legislation in Mozambique, Namibia and Zambia

Criteria	Mozambique	Namibia	Zambia
Land ownership	1995 Land Policy, 1997 Land Law and 1999 Regulation. Provides rights of occupation for people with > 10 years residency; collective land rights 3-9 signatories. Land administration capacity still weak at the local level.	Communal Land Reform Act (2002) Section 17: All land is vested in the state in trust for traditional communities. Traditional authorities allocate land for residential use and cultivation. Communal land boards leases for agriculture, tourism. Traditional authorities consulted.	Land Act of 1995 created two classes of land; State land and Customary Land. Customary Land is vested in the president on behalf of the residents.
Resource rights	1997 Forest and Wildlife Policy, 1999 Law and 2002 Regulation Provides limited access for communities to wildlife and forest resources. Licences for harvesting forest products are issued on approval of a management plan.	Limited rights over wildlife devolved to communal conservancies through Nature Conservation Amendment Act 1996. Forest Act (12 of 2001) establishes community forests. Allows communities to harvest within a management plan.	Wildlife Act of 1998; Quasi statutory body. Wildlife in GMAs to be co-managed by community resource boards and wildlife agency. Forest Act revised in 1999 provided for joint forest management and sustainable use of forests. Not implemented and *de jure* reverted to 1973 Forest Act.
Benefits	Forestry: 20% of forest royalties and 50% of fines back to community scouts and forest guards. Wildlife: Communities can receive 50% of the value of the leases negotiated with private sector. If communities have a DUAT they are able to negotiate and enter into agreements with private sector organizations and retain 100% of the revenue.	Rights to benefits from both wildlife and forestry as long as within the quotas established in the management plan. Community earns and retains all income.	Wildlife Act of 1998 provides a revenue sharing formula with the Zambian Wildlife Authority (ZAWA), the statutory board; more importantly proprietorship lies with ZAWA.
Political vs. traditional rights	Clashes between traditional/ customary laws and modern political systems; poor people disenfranchised.	Wildlife conservancies do not have to have support of TAs in law but in practice it is needed. Community forests *de jure* approval of TA required.	Traditional leaders have strong de facto powers; administration of land remains highly centralized with little or no participation in decision making.
Cross-sectoral links (mining and agriculture)	Poor coordination of national, provincial, district and local authorities for the management of natural resources.	Ministry of Agriculture sees the Caprivi as the national breadbasket; promotes irrigation schemes in Caprivi; encourages commercial agriculture; conflicts with wildlife and forestry legislation.	Poor sectoral coordination, with mining and agriculture taking precedence in legislation

Sources: Compiled from Nhantumbo and Izidine (2009), Jones and Barnes (2009) and Chundama (2009)

The contradiction within the legal and policy reforms for land is that the predominance of state control means that there are no legal markets for land in the communal areas of the three countries. This means that for communities, decisions over their most valuable asset is not guided by price. This leads to either bureaucratic decisions that are often highly contested (as in Namibia) or illegal land markets that tend to end up benefiting existing elites (Bond, 2001).

The most significant change in policy and legislation is that for the management of wildlife and timber resources. In all three countries relatively recent changes to legislation allow communities to co-manage wildlife and forests in partnership with government. For example, in Namibia the 1996 Amendment to the Nature Conservation Act allows the establishment of self-defined, legally mandated community conservancies. There are now over 50 registered conservancies, with 260,000 members managing in excess of 115,000 km^2 of land (NACSO, 2008). The Forestry Act (12 of 2001) allows for the establishment of community forests (Jones and Barnes, 2009). Similarly in Mozambique the combined effect of the 1997 Forest and Wildlife Policy together with the 1999 Law and 2002 Regulation allows communities to manage wildlife and forest resources (Nhantumbo and Izidine, 2009). In both Mozambique and Namibia the management must take place within a pre-agreed management plan.

In Zambia, the Wildlife Act of 1998 devolves management rights to community resource boards (Chundama, 2009). However, the legal and policy framework for forests is far less certain. The revised Forest Act of 1990 makes provision for joint forest management and the sustainable use of forests. But the legislation has not been implemented, which means that the ruling legislation for Zambia is the 1973 Forest Act.

The changes above also affect how communities and individuals can benefit financially from the management of key resources such as wildlife and timber. Before the CBNRM inspired reform, process contracts for the use of wildlife and the harvest of timber were managed by the state and all the financial benefits accrued to the state. The control of the contracts and the re-allocation of these benefits is an essential element of the economic instrumentalism characteristic of CBNRM in the region. However, there are significant differences across the region and even between the legislative instruments within each country (Table 4). The Namibian legislation gives the strongest rights to community conservancies and community forests. For both wildlife and timber the communities' organizations can enter into agreements and retain 100 per cent of the value of the contract (Jones, 2009). In Mozambique, communities can retain 100 per cent of the revenue from wildlife but are required to enter into revenue sharing agreements with government over timber royalties (20 per cent) and fines from illegal activities (50 per cent). The requirements for accessing the revenue include community registration as a legal entity as well as opening a bank account. These requirements have hindered access to the benefits. Out of more than 900 communities eligible to receiving the 20 per cent only a third have benefited (Nhantumbo and Izidine, 2009).

In Zambia, the benefits to community resource boards are also governed by a revenue sharing agreement (Chundama, 2009). While community organizations do receive benefits from the revenue sharing agreements with government these often have to be applied for and payments are frequently delayed for months, even years, thus weakening the fundamental premise that these are valuable resources owned and managed by the community (Chundama, 2009).

Table 5. Details of revenue sharing agreements in Mozambique, Namibia and Zambia

	Mozambique	Namibia	Zambia
Wildlife revenues	50% revenue sharing with government	100% accrue to communal land conservancy	Revenue sharing formula with ZAWA and government
	n/a[18]	n/a	Hunting: community 45%; traditional authority 5%; government 10%; ZAWA 40%
	n/a	n/a	Tourism: community 15%; traditional authority 5%; ZAWA 80%
Forestry revenue	Revenue sharing with government 20% of forest royalties; 50% of fines	100% accrues to community	No JFM framework in place

Sources: Compiled from Nhantumbo and Izidine (2009), Jones and Barnes (2009) and Chundama (2009)

Traditional leaders in all three countries have an important and ongoing role to play in the management of land and natural resources. At the community level, traditional authorities are often seen as the sole and legitimate authority over land – especially in very remote areas where the lack of access seriously diminishes the power of government officials. The overlapping jurisdiction and conflicts between the traditional systems and modern legislative mechanisms are a major challenge for the governance of natural resources in all the countries in the region. This is particularly evident in Zambia where traditional leaders have very strong *de facto* powers over land and resources, but *de jure* the administration is highly centralized with government (Chundama, 2009). A similar situation prevails in Mozambique (Nhantumbo and Izidine, 2009). In Namibia some steps have been taken to resolve the differences between traditional leaders and the legislation. For example, the formation of community forests requires the explicit support of traditional leaders (Jones and Barnes, 2009). Although explicit support of traditional leaders is not required for communal wildlife conservancies there is tacit agreement that a conservancy cannot be formed without their approval (Jones and Barnes, 2009).

The final element of the framework considers the extent to which legislation for land and the management of natural resources has been linked with other

18. n/a denotes not applicable.

sectoral-specific legislation such as mining and agriculture. In all three countries, the degree of coordination and harmonization of the policy and legislation across sectors is poor. In Zambia, there is a clear hierarchy of legislation in which mining and agriculture have priority (Chundama, 2009). In Namibia, a direct expression of this is seen in the Caprivi Region. The Ministry of Agriculture sees the Caprivi Region as the breadbasket of the country and repeatedly promotes large-scale irrigated agriculture. In contrast, the Ministry of Environment and Tourism (MET) promotes sustainable use of wildlife and forestry activities (Jones, 2009). The government of Mozambique is slowly rebuilding its capacity and does not have the resources to project and coordinate a cohesive, cross-sectoral policy across the whole country (Nhantumbo and Izidine, 2009). Typically, large capital intensive investments such as mining projects that are perceived as generators of export revenue and taxes will take priority in the planning process.

This brief review of the legal and policy frameworks for the countries in the study shows that there has been progress towards creating a devolved framework for the management of land and natural resources by communities. Progress has stimulated substantial changes in the way wildlife found in the communal areas has been managed. In Namibia, there is a wide-ranging and growing network of communal land conservancies. In Mozambique, there are approximately 68 individual wildlife and forestry-based CBNRM projects (Nhantumbo and Izidine, 2009). In Zambia, the focus of wildlife-based CBNRM has been on those communities living in the Game Management Areas, through the ADMADE programme and the LIRDP in the Luangwa Valley. The key lesson is that where people have benefited directly from wildlife there has been a positive change in their attitude towards wildlife and conservation (Dalal-Clayton and Child, 2003). However, the Mozambique review notes that:

> The participation of communities in natural resources management brought an unprecedented expectation that stronger rights to resources would result in poverty alleviation and reduction of unsustainable use practices such as wildfires. However, the enthusiasm and hope of improved livelihoods soon changed into a frustration and CBNRM in forest rich areas seem to meet only one objective: environmental sustainability (Nhantumbo and Izidine, 2009).

This is broadly true of the livelihood impacts of the CBRNM programmes in all three countries. Good progress has been made the organizational and institutional framework for the management of resources, but the impact on people's lives has generally fallen short of expectations. A wide-ranging analysis and critique of CBNRM attributes this to the changes in the legislation that only partially empowered communities to manage their land and natural resources (Murphree and Taylor, 2009). The authors argue that further progress through CBNRM is dependent on the changes to the legislative frameworks and the implementation approaches that put communities at the centre of process rather than those organizations that seek to retain control over resources.

3.4 Implications for the development of REDD+

The second part of this section analyses the current legal and policy frameworks with particular reference to the anticipated requirements for REDD+. The framework used for the analysis is derived from Cotula and Mayers (2009) who developed the framework for the analysis of tenure over land and natural resources in seven countries with substantial tropical forests.[19] We use the first four elements of the six-part framework to analyse whether the current legislative framework is appropriate for REDD+ (Table 6).

Table 6. Analysis of policy and legislation from a REDD+ perspective

	Mozambique	Namibia	Zambia
1. There are strong local rights to land	Land policy offers the opportunity for strong collective rights over land and natural resources.	Land rights unclear; rights to resources in community forests and conservancies clear.	Rights over land, wildlife and forestry resources highly contested.
2. The carbon rights are clearly allocated	Not allocated, there are no clear rights over carbon.	Issues not yet discussed at national level.	No clear rights over carbon.
3. There are practical measures for cross-sectoral engagement	Institutional framework is dominated by fragmented roles.	Policy conflicts between agriculture and other sectors (wildlife and forestry) not resolved.	Major policy conflicts between agriculture and mining in particular.
4. Effective mechanisms to channel benefits to local levels exist	Working models in wildlife and forestry, but share of revenue. Co-management framework with government.	Within the framework of the established conservancies and community forests community organisations are able to get 100 percent of benefits earned from contracts with private sector.	Mechanisms exist for sharing benefits, government and ZAWA primary beneficiaries; control with government.

Source: After Cotula and Mayers (2009)

3.4.1 Strong local rights to land

Strong and defined land tenure is critical for the effective implementation of REDD+ for at least two reasons. These are: insecure tenure may in itself promote deforestation; and without secure tenure resource users have little incentive to protect trees and forest clearance is often a way of showing occupation (Cotula and Mayers, 2009). In Mozambique, Namibia and Zambia, communal area residents have, at best, weak tenure over land. Legally, communal land is held in trust on behalf of communities by the state. In practice, traditional leaders generally allocate land and this is perceived as their legitimate role. As in many countries, user rights over land for cultivation are claimed by clearing it for agriculture.

19. The countries reviewed were: Brazil, Cameroon, the Democratic Republic of Congo, Guyana, Indonesia, Malaysia and Papua New Guinea (Cotula and Mayers, 2009).

Photo: Muyeye Chambwera

The rights to graze in open woodlands, Mozambique

The DUAT or Land Use and Management Certificate process in Namibia appears to offer communities much greater rights than in the other two countries. However, the number of communities that have successfully applied for and been granted DUATs is constrained by the limited resources of government, other supporting organizations and the limited knowledge of communities themselves.

3.4.2 Carbon rights are clearly allocated

If REDD+ is going to be implemented through a carbon trading system then the rights to carbon will be absolutely critical to its success (Cotula and Mayers, 2009). There is some interesting experience on the importance of carbon rights from Australia and New Zealand. Australia has established carbon rights that exist perpetually on the land title and define liability for re-emission, thereby ensuring permanence of emissions reductions. In New Zealand, a government decision in 2002 to control carbon resulted in a net decline in forest investment and production. The decision was subsequently reversed in 2007 (Cotula and Mayers, 2009).

To date, there has been little if any discussion about carbon rights in southern Africa or miombo region countries. It is, however, instructive to look at the existing precedents for minerals and other valuable natural resources. Across the region mineral rights are vested in the state and communities have no rights. In the practical hierarchy of legislation, mineral rights also supersede other legislation

due to the economic importance of mining. If carbon were to be classified as a mineral by countries in the region it would severely limit communities' access to REDD+ incentives.

Although mineral rights provide one option for the allocation of carbon rights in southern Africa, it is probably more realistic to look at forestry legislation for clues to the future rights over carbon. Through different kinds of instruments, both Namibia and Mozambique offer strong rights to communities over timber and the benefits from timber. The difference between them lies in the implementation of the legislation. In Namibia, the government, with support from NGOs, is facilitating and meeting many of the demands for communities to form conservancies. In Mozambique, as noted, the government is struggling to facilitate communities who wish to form DUATs (Nhantumbo and Izidine, 2009). In Zambia, policy and legislation over timber and forests is in limbo with the most recent legal changes not having been implemented with the *de jure* legislation dating from 1973 (Chundama, 2009).

3.4.3 Practical measures for cross-sectoral engagement

Reducing deforestation and land-use change depends on good and effective policy for forests as well as effective and practical measures for cross-sectoral engagement and policy cohesion (Cotula and Mayers, 2009). Policy areas that are highly relevant are agriculture, mining and the provision of infrastructure, especially roads.

In general, policy cohesion within the three countries is generally weak. In Mozambique there is often a significant gap between policy and practice because government has limited resources (Nhantumbo and Izidine, 2009). The conflicting policies and aspirations of government in the Caprivi Region of Namibia are a perfect example of the failure of cross-sectoral engagement. Despite its low rainfall and poor soils, the Caprivi Region is seen by the Ministry of Agriculture as the breadbasket of Namibia and has consistently approved irrigation and most recently bio-fuels projects[20] (Jones and Barnes, 2009). In contrast, the Ministry of Environment is supporting wildlife and community forest projects that would be in direct conflict with any agricultural-based projects.

3.4.4 Effective mechanisms to channel benefits to local levels exist

Over the last decade there have been legal and policy changes that allow communities in all three countries to benefit from the exploitation of wildlife and forest resources. The strength of these measures varies between the three countries. In Namibia registered community-based organizations retain 100 per cent of the revenue while in Zambia and Mozambique revenue sharing arrangements are in place (see Table 5).

20. Although to date none of the projects has been implemented.

There are a number of problems with these revenue sharing agreements. Firstly, the agreements with the private sector user are usually signed by government and the revenue accrues to government or its proxy. Secondly, the revenue is paid in arrears to the communities, and payment is often conditional upon the approval of a project or budget. In addition, there are often legal requirements such as community registration and opening of official bank accounts. For example, in Mozambique only one third of the communities eligible for revenue sharing have received any money because of problems over registration and bank accounts (Nhantumbo and Izidine, 2009). The key problem with these mechanisms is that they all serve to reduce the community proprietorship over revenue and by default the resource (Bond, 2001).

As models and lessons for REDD+ these experiences should be considered as first steps. However, linking international carbon markets to rural communities for the management of woodlands that avoid bureaucratic challenges of government and rent extraction in the supply chain will be a considerable challenge.[21] The region's CBNRM experience can be constructively used to develop a set of real-life principles that can be used to guide the mechanisms by which the full value of REDD+ revenues reach communities in a timely way that increases rather than decreases their sense of proprietorship over woodland resources.

3.4.5 Policy development is linked with ongoing learning

In their recommendations Cotula and Mayers (2009) make two strong additional points about the importance of linking national policies to international policies and the need to constantly facilitate learning for REDD+. The experience of CBNRM suggests that within the region countries have learned from each other and that policy development has been informed by debate and discussion at the international level (Child, 2009). However, the evolution of policy and legislation for REDD+ are likely to be very different from the pathway for CBNRM, which was much more context and country specific, and will have to be informed by international policy and practice.

There is mixed evidence from the three countries of the learning as an integral part of the policy cycle. In Namibia, there is strong evidence of ongoing devolution of management responsibilities to communities such as the granting of rights to a small San community in the West Caprivi National Park (Taylor, 2007; Balint and Bond, unpublished). In Mozambique, there is also evidence of ongoing policy formulation although the process is limited by the weakness of government to implement and coordinate legislation (Nhantumbo and Izidine, 2009). In Zambia it appears that policy formulation and implementation is largely paralysed due to the competing and vested interests of different stakeholders (Chundama, 2009).

21. In Sudan a forensic analysis of overseas development assistance for healthcare showed that only 19 per cent reached the clinics for which it was intended (Collier, 2008).

3.5 Summary

This section of the report has reviewed current status of natural resource legislation and policy in Mozambique, Namibia and Zambia. We have also undertaken a brief analysis of the legislation from a REDD+ perspective. We conclude with four important lessons from this section for the future of REDD+ in southern Africa and specifically in the miombo region. These are:

3.5.1 Policy changes and legal changes are discrete rather than continuous

The experience from the three countries is that policy changes are not generally part of a continuous policy cycle in which changes are made, the effects monitored and further policy developed. Changes have been more closely associated with discrete policy windows, which in the cases of Mozambique and Namibia were due to substantive changes in government. However, legal and policy changes to allow countries and communities in the miombo region to participate in REDD+ will have to break this pattern and become part of an ongoing policy reform process.

3.5.2 Policy and legal changes are generally sector specific

When there have been changes, these have tended to be sector specific, resulting in legal and policy frameworks that are not consistent. The example of the differences in communal land conservancies and community forests in Caprivi Region of Namibia are a good example of the lack of coordination. Some of the practical problems generated by sector-specific policy have been documented here and in the country reports. The reduction in deforestation will require legal and policy changes that are coherent and coordinated across relevant sectors especially land, agriculture, infrastructure and energy. In this respect, the experience from CBNRM does not provide a successful model for the region upon which REDD+ can be implemented.

3.5.3 Broad trend towards devolved resource management

From the three countries and more broadly from across the region there is a trend towards the devolved management of natural resources. However, there have also been indications of re-centralization of policy in the region albeit not in the three countries included in this study.[22] It is generally agreed that if payments are to be made to reduce deforestation that these will need to accrue directly to resource and land managers (Pagiola and Bosquet, 2009). This is especially relevant in the context of southern Africa where deforestation is largely being driven by the demand for agricultural land by smallholders and need for wood-fuel.

22. In Zimbabwe there has been a significant effort to re-centralize wildlife policy (Bond and Cumming, 2006).

3.5.4 Growing acceptance of markets in the management of natural resources

The last two decades of CBNRM policy change and support in the region have largely been based on a growing acceptance that markets can and do have a fundamental role to play in the management of natural resources. Across the region there are strong utilitarian ('use it or lose it' philosophy) and neo-liberal approach to resource management. This means that there is unlikely to be any major philosophical resistance to the principle of payments for REDD+ as there may well be in other cultures (see Robertson and Wunder, 2005). The major challenge within the miombo region will be the lack of clarity over land, which will lead to conflict over ownership, woodland resources and possibly carbon rights.

Estimating regional carbon supply from the miombo woodlands

4.1 Introduction

As with many other ecosystems, miombo woodlands are settled and converted to other uses because these uses provide the land manager with a higher rate of return than is earned from the maintenance of the indigenous vegetation (Bond *et al.*, 2009). In the miombo region, land is generally cleared for settlement, agriculture and fuel wood (Campbell *et al.*, 2007). The construction or improvement of roads, and the development of settlements and agricultural policies, are all indirect drivers of deforestation. Any new initiative such as REDD+ that is dependent on forest will compete with these uses. For areas that are likely to be converted to non-forest uses, the benefits from REDD+ need to be equal or exceed those from these alternative uses i.e. the opportunity costs.

The practical questions that are frequently raised at national level with regards to REDD+ include:

- How many emissions reductions can a country potentially sell under a REDD+ mechanism?
- How much could a country benefit from these sales?
- What measures can actually be used to reduce deforestation in order to generate the emission reductions?

Source: Pagiola and Bosquet (2009)

Photo: Muyeye Chambwera

Addressing different drivers to reduce carbon loss: Fire and agriculture in Mozambique

This chapter analyses the opportunity costs of land use in Mozambique, Namibia and Zambia in order to estimate the emissions reductions that each of our study countries might be able to sell at different carbon prices and the net benefits to each. The analyses in this section use data from country studies and other sources such as the FAO database and Campbell *et al.* (2007) to arrive at indicative supply estimates. These are the first estimates of a REDD+ supply curve and, due to the data limitations, the estimates are still crude.

Developing a regional supply curve for REDD+ involves understanding the three different costs that are associated with REDD+, the opportunity costs, the implementation costs and the transaction costs. Our analysis uses the definitions used by Pagiola and Bosquet (2009), but does not separate implementation and transaction costs due to lack of data. Our main aim is to separate opportunity costs from these other costs.

Box 1. Definitions used

Opportunity costs: The opportunity costs of land use are those benefits foregone by the land owner or land manager from not undertaking those activities that reduce the carbon stock of the miombo woodlands such as clearing for agriculture, logging for fuel wood, charcoal and timber.

Implementation costs: The implementation costs of REDD+ are the costs that are directly associated with the actions leading to deforestation. In the case of miombo woodlands these may be strengthening tenure for communities over land; monitoring and patrolling to prevent immigrants; the illegal harvesting of timber and non-timber forest products; and payment of compensation to landowners to cover their opportunity costs.

Transaction costs: The transaction costs are the costs incurred by the parties as a result of a REDD+ transaction. For the countries of the miombo region, many of these costs would be associated with verifying that the action taken has resulted in a reduction of emissions.

Source: Pagiola and Bosquet (2009)

The effect of incorporating transaction and implementation costs is to increase the total cost of securing emission reduction, or shifting the supply curve upwards. This curve shows what it will cost the government or organization administering REDD+ to achieve the desired reduction in deforestation and emissions. It is essential to separate these costs from opportunity costs to ensure that the level of those that directly address the immediate drivers of forest loss are known, as these are what the agents of deforestation would respond to, irrespective of the implementation and transaction costs. For example, small-scale farmers who usually convert forests to cultivation are more interested in the level of net payments they could receive from REDD+ for them to stop forest conversion, and not how much it costs for REDD+ to proceed.

4.2 Methodology

The international reviews of payments for avoided deforestation have generated several broad-based estimates for the scale of the costs involved. In analysing opportunity costs of avoiding deforestation in the eight countries with tropical forests that account for 70 per cent of the global emissions from forests, it was estimated that it would cost between US$1 and US$2/t CO_2 to totally eliminate deforestation (Stern, 2007). A second estimate suggests that to halve the emissions from deforestation between 2005 and 2030 would require a payment of between US$10 and US$21/t CO_2. This would entail payments of between US$17 and US$28 billion per annum from developed to developing countries (Kinderman *et al.*, 2008). A recent review of 29 empirical studies estimated a mean opportunity cost of US2.51/t CO_2 (Boucher, 2008). The opportunity costs were regionally differentiated with the lowest being in Africa at US$2.20/t CO_2; the Americas at US$2.90/t CO_2 and Asia US$2.90/t CO_2. Estimates of transaction and implementation costs are at a very preliminary stage simply because of the limited number of REDD+ projects and the short period over which they have been operational. Approaches therefore vary, Grieg-Gran (2006) drawing from experience of payments for environmental services schemes in Latin America, proposes that implementation and transaction costs will be between 5 per cent and 20 per cent of the opportunity costs of avoiding deforestation, while Boucher (2008) uses a cost of US$1/t CO_2 (see Pagiola and Bosquet, 2009).

The costs of REDD+ estimated at global levels do not reflect local realities as the opportunity costs vary from region to region and from country to country. The global economic benefits from agricultural lands range widely, for example from zero to $6,500 per hectare (Naidoo and Iwamura, 2007). A closer examination of opportunity costs at country level provided an opportunity to estimate a likely supply of forest-based emission reductions in the three case studies. However, in constructing a REDD+ supply curve for the miombo region the following issues become apparent:

- **Limited data on deforestation:** The data on the conversion of miombo woodlands to other uses are extremely coarse. For Mozambique and Zambia in particular the data on deforestation are given at a national level and are not specifically for the miombo woodlands. The most recent data for the region are from the FAO. The annual rates of change and the total forest areas as given by this data source are generally considered to be unreliable (Campbell *et al.*, 2007).

- **Variability of miombo woodlands:** Miombo woodlands are broadly defined by the presence of key species, but they are intrinsically heterogeneous and vary considerably across the region (Campbell *et al.*, 2007). Within the woodlands settlement cultivation is dispersed as farmers seek out the best soils within the key constraints of the availability of water and transport links (Martin, 1986). The variability of miombo and how people use the woodlands mean that the boundaries between different uses are very unclear. For the purposes of this

exercise, we have bundled returns from agriculture, fuel wood and timber together for Zambia, and agriculture and fuel wood together for Mozambique. However, fuel wood and timber are considered to be one-off harvests.

- **Carbon values:** The carbon cycle in dryland forests and especially in miombo woodlands is poorly understood (Grace *et al*., 2006). One can assume that the conversion of miombo woodlands to settlement and agriculture results in a loss of 40 t C ha^{-1} (upper limit of stem carbon of 27 t C ha^{-1} and 13 t C ha^{-1}). These figures are from miombo woodlands in a region of mean annual rainfall of 900 mm and could be an underestimate for locations elsewhere in the region (Ryan, 2009). The Zambia and Mozambique country studies (Chundama, 2009; Nhantumbo and Izidine, 2009) provide different estimates of carbon lost from forests due to deforestation.

4.3 Quantifying the key variables

The estimation of the supply of emission reductions from the miombo involved quantifying the key variables that were used in our supply model (Table 7). The main variables are discussed below.

4.3.1 Returns to alternative land uses

We used data from country studies that estimated the relevant uses driving deforestation in the miombo region. The main uses are agricultural expansion, charcoal and timber extraction. While there are other uses that lead to the loss of forest carbon, these are the dominant ones and for which use values are easy to estimate:

- Cultivation: Returns from cultivation accrue over the entire analysis period i.e. 30 years.
- Charcoal: In a 30-year period, charcoal benefits accrue only in the first year. This is especially true if an area cut for charcoal is subsequently used for cultivation.
- Timber: Similarly, timber revenues are only enjoyed in the first year of conversion.

Starting with gross revenues or returns per hectare, we estimate net returns to alternative land uses by assuming that the net returns are 20 per cent of gross revenues, the rest going to production costs. Grieg-Gran (2008) used a 15 per cent rate of return on costs for Ghana, but we assume that in the miombo, where inputs like own labour are not valued by subsistence producers, the proportion of net returns is higher.

4.3.2 Carbon losses avoided

Cultivation: Cultivation converts land into a different use, and removes all stem carbon, leaving mostly soil carbon. Based on the Mozambique case study, and on Williams *et al*. (2008), unconverted woodlands store about 120 t C ha^{-1} (19 t stem carbon and 119 t soil carbon) while converted land would have about

75 t ha^{-1}, mostly as soil carbon. If forests are not converted, the carbon loss avoided is 45 t ha^{-1}. The Zambia case study estimates that 60.14 tonnes per hectare of carbon are lost due to deforestation (Chundama, 2009).

Charcoal and timber: Charcoal alone leads to about 30 t ha^{-1} loss in carbon, mainly due to re-growth. However, charcoal and timber on their own remove only part of the forest carbon (and returns from them per unit area accrue only in an analysis cycle of 30 years). Regeneration of deforested miombo makes the estimation of total carbon lost difficult. When cultivation follows charcoal and timber extraction, the returns in the initial year are higher than in subsequent years. In Namibia, charcoal and timber were not identified as threats to forests.

4.3.3 Rates of deforestation

Country studies and secondary sources provided the latest rates of deforestation. Current deforestation rates were used annually for the entire analysis period. It is recognized that rates of deforestation may change in the future even without REDD+. Economic factors such as increasing agricultural commodity prices may accelerate rates of deforestation while the rate of agricultural clearance may slow down if most of the forests left are in inaccessible or unproductive areas. These factors were not taken into account in this study.

4.3.4 Transaction and implementation costs

Pagiola and Bosquets (2009) quote costs ranging from 5 per cent to 20 per cent of opportunity costs as transaction costs. This study uses an average value of 12.5 per cent but bears in mind that actual implementation costs will differ from country to country.

Table 7. Baseline values of key variables

Key variable	Baseline value		
	Namibia	Mozambique	Zambia
Net returns to alternative land uses (US$/ha/year)			
Cultivation	45	28	88
Charcoal	0	350	808
Timber	0	0	104
Forest cover (1,000 ha)	7,661	19,262	42,452
Forest loss (ha/annum)	73,400	217,000	445,000
Avoided carbon stocks (t/ha)	45	45	60
Discount rate	10%	10%	10%
Time horizon (years)	30	30	30
Transaction and implementation costs (% of payment)	12.5%	12.5%	12.5%

4.3.5 Discount rate

Recent REDD+ studies generally apply a discount rate of 10 per cent e.g. Grieg-Gran (2008) and Pagiola and Bosquet (2009). A few studies use discount rates as high as 20 per cent (see Grieg-Gran, 2008). The discount rate used for agricultural projects in developing countries falls between 8 per cent and 15 per cent (Gittinger, 1982; Organization of American States, 1991). This study uses a rate of 10 per cent as a starting point and carries out sensitivity analyses to assess the effect of changing the discount rate. This is because the opportunity cost of capital, which is a good indicator of the discount rate, cannot be estimated with certainty and will vary between countries and over time (Organisation of American States, 1991).

The analyses were conducted for avoiding deforestation in a single year, and the value of land uses foregone by avoiding that deforestation valued over a 30-year period. For example, every year, 445,000 ha of forests are lost to deforestation. Totally avoiding deforestation in Zambia for one year for REDD+ makes 445,000 ha available for carbon storage. The opportunity cost is calculated as the net value accruing to the land manager over 30 years if it had been converted to other land uses. These uses include agriculture, charcoal and timber. In reality, it is possible to reduce deforestation in a country by only a certain amount compared to the current rate of deforestation.

The value of carrying out analyses for one year provides decision makers with an idea of what it means to participate in REDD+. Emission reductions in subsequent years would then be estimated as a deliberate choice of land managers or countries based on the knowledge of opportunity costs and the possibility of totally halting deforestation in a single year. This could be done by assuming what is practically possible to do in order to reduce deforestation in a country and use that to estimate the potential reduction in deforestation in the future. Alternatively, a dynamic optimization approach can be used to estimate the potential land-use conversions. This study did not go into these analyses as they require more detailed data.

4.4 Results

In interpreting the following results, it is important to note that the figures pertain to totally stopping deforestation in a single year and maintaining the area of forest conserved as forest for 30 years, as explained above.

The total carbon supply potential of the three countries is 39.8 million tonnes of CO_2, with Namibia, Mozambique and Zambia being capable of supplying 3.3 million tonnes, 9.77 million tonnes and 26.76 million tonnes respectively by totally stopping deforestation in a single year. Zambia has the potential to supply the highest emission reductions because of its currently high levels of deforestation while Namibia has the least emission reduction potential.

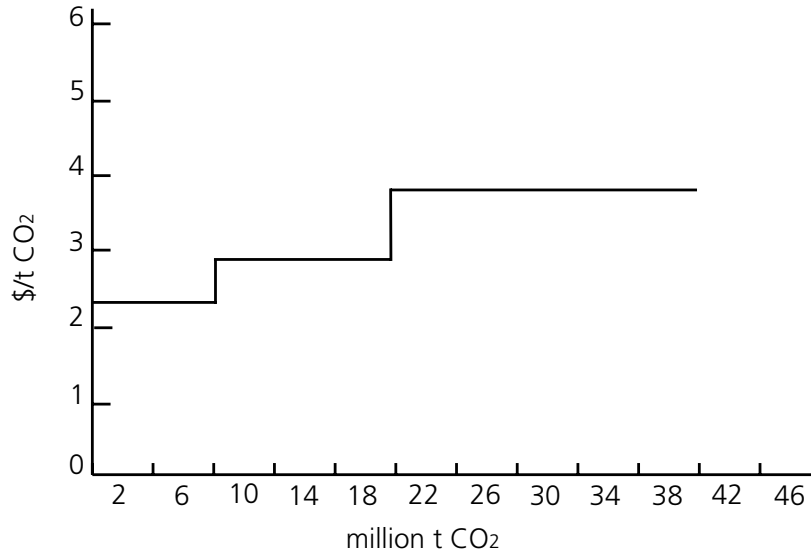
The opportunity costs based on the key deforestation drivers (agriculture, timber and charcoal) for each country are also shown in the table. The highest costs are in Zambia and the lowest in Mozambique, largely because of the low returns to agriculture in the country (yield and price of output).

Table 8. The opportunity cost of different land uses in Namibia, Mozambique and Zambia

Opportunity cost ($/t CO_2)	Namibia	Mozambique	Zambia
Agriculture only	2.49	2.12	2.77
Agriculture and charcoal	2.49	2.60	3.60
Agriculture, charcoal and timber benefits	2.49	2.60	3.71

Considering agriculture only, at a price of $2.12 per ton of CO_2, the region would supply only the 9.7 million tonnes of CO_2 from Mozambique. The total potential supply from the three countries would only be realized when the price of carbon rises to $2.8 for agricultural benefits only. Because of the importance of charcoal and timber, the price that would guarantee a financial incentive to stop all deforesting activities in Zambia needs to be at least $3.71 per ton of CO_2. In Mozambique, a lower price attracts more carbon reductions than in Namibia at a higher price when only cultivation is considered. Plotting these opportunity costs against the possible emission reductions yielded a type of supply curve (Figure 2). The area under the curve is the total cost to buyers or total revenue to suppliers of forest carbon credits.

Figure 2. Possible supply curve for Namibia, Mozambique and Zambia



Source: Authors' estimates

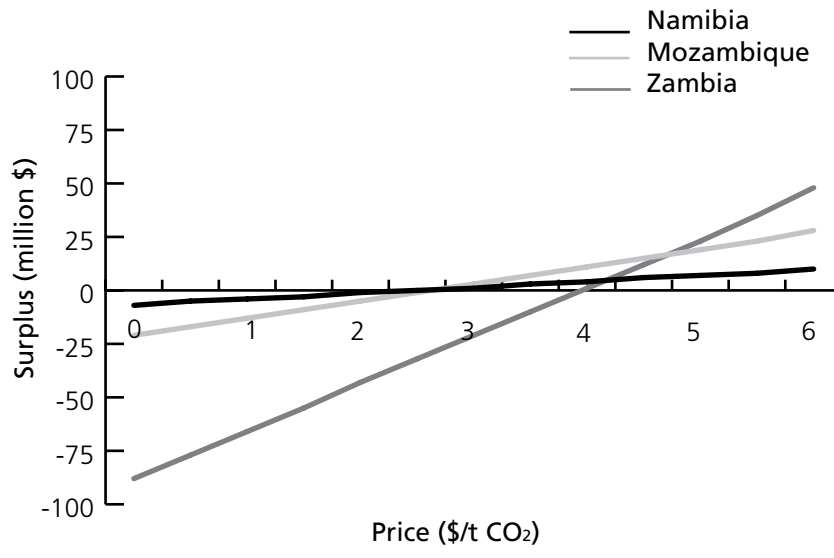
The potential of the three countries in the study to earn REDD+ revenues varies considerably (Table 9). In the semi-arid Caprivi Strip of Namibia where the deforestation rates are low, the revenues are low. At the other extreme, Zambia has the highest potential to earn REDD+ revenues if it can reduce its high rate of deforestation.

Table 9. Total revenues accruing to countries from supplying carbon at prices equal to the opportunity cost of REDD+

Total revenue (discounted) in millions $	Namibia	Mozambique	Zambia
Agriculture only	8	21	74
Agriculture and charcoal	8	25	96
Agriculture, charcoal and timber benefits	8	25	99

A country that participates in REDD+ at other prices of carbon will either have a net benefit or net loss, depending on the price and other costs. Assuming the sum of transaction and implementation costs is 12.5 per cent of opportunity costs, the surpluses accruing to countries after covering all costs have been estimated (Figure 3).

Figure 3. Surplus accruing to countries at different prices of carbon



Source: Authors' estimates

While Zambia has the highest potential to make the largest surplus from REDD+ with high carbon prices, it also runs the risk of making large shortfalls with slight changes in carbon prices. If a regional approach is adopted in buying forest carbon emission reductions, the minimum price is \$3.71/t CO_2. Actual implementation and transaction costs are difficult to estimate as these are dependent on various other factors, and are highly variable from place to place. The Namibia country study has estimated that, on the basis of CBNRM costs, implementing REDD+ from scratch in the Caprivi Region would cost N\$33 million per annum or about US\$4.5 million (Jones and Barnes, 2009). This would, however, be significantly reduced by using existing CBNRM systems and structures.

4.5 Sensitivity analysis

Sensitivity analyses were carried out on selected variables to assess changes in baseline results if values of these variables change.

Returns to alternative land uses: The returns to land uses are highly variable, especially from cultivation. The economics of land conversion, especially in rural areas, is very complex, as discussed earlier. While it is easy to estimate the value of returns to land under cultivation by using average yield and commodity prices, agricultural output in rural settings is mostly consumed on the farm and the surplus that is sold is highly unpredictable. Because of the variety of crops grown in rural areas, the returns to land under agriculture used in our calculations do not adequately capture the productivity and values of different crops. In sensitivity analysis, we have focused on this variable, and assessed how outcomes would change at different values of land.

Carbon losses avoided: This variable is not constant across the region, and the available data are limited. Wet and dry miombo forests have carbon densities ranging between 15 and 100 t C ha^{-1} in woody biomass (Frost, 1996) and therefore the amount of carbon loss avoided by avoiding deforestation changes. The extent of forest cover is also highly variable across the eco-region.

Discount rate: We also tested the effect on the results of using different discount rates. The assumption is that land users in different circumstances have different time preferences. For example, rural farmers needing to meet their most immediate needs may prefer benefits earlier rather than later and thus would have higher discount rates.

Transaction and implementation costs: Costs vary widely across the region. In addition to national level costs of REDD+, local level costs incurred by farmers and communities in getting verified, obtaining and processing payments, getting organized into groups may significantly increase total implementation and transaction costs. This effect is tested by increasing implementation and transaction above the baseline value of 12.5 per cent.

The outcomes of these changes were assessed against a scenario in which implementation and transaction costs are not included, and where the value of land is based on returns from agriculture only (without charcoal and timber).

4.5.1 Effect of reducing value of land under agriculture

We assumed the value of land based on average yield and price represents the best possible outcome from rural cultivation. In a typical rural setting, yields and prices are likely to vary widely from the baseline.

The effect would be to reduce the opportunity costs and thus the price at which REDD+ payments may compensate land owners for foregone alternatives (Table 10). The effect is highest in Namibia where 50 per cent reduction in agricultural value reduces opportunity costs by almost half, but by less than half in Zambia where other uses such as charcoal and timber still provide value to land users.

It must be noted, however, that opportunity costs based on agricultural productivity alone undervalue land, as communities derive other benefits from it. If these benefits are compatible with REDD+, the opportunity costs are likely to decline. If these benefits will not continue as a result of REDD+, opportunity costs, and thus the price of carbon, would have to increase.

Table 10. Effect of varying the value of land under agriculture against the baseline

Scenario: Agricultural value of land against baseline	Opportunity cost ($/t CO_2)		
	Namibia	Mozambique	Zambia
Baseline	2.49	2.60	3.71
25 % below baseline	1.87	2.07	2.91
50% below baseline	1.25	1.54	2.32

Source: Authors' calculations

4.5.2 Effect of changing carbon lost due to deforestation

In the baseline scenario, we assumed that the amount of carbon loss avoided due to avoided deforestation is around 45 ha^{-1} in Mozambique and Namibia, and around 60 ha^{-1} in Zambia. Changing this value has an effect on the REDD+ supply situation in the region (Table 11). Increasing the value of carbon loss avoided reduces the opportunity cost of REDD+ significantly.

Estimates of carbon stocks are affected by various factors, including tree density, method of measurement, carbon storage capacity etc. (Gibbs *et al.*, 2007; Williams *et al.*, 2008). Specific REDD+ transactions would require investment in accurate carbon stock estimations in specific countries or regions of the same country. Using the Mozambican value in Zambia, for example, would overstate the potential price of carbon.

Table 11. Effect of varying the amount of carbon loss avoided due to deforestation against the baseline

Scenario: Amount of carbon loss avoided (tC/ha)	Opportunity cost ($/t CO_2)		
	Namibia	Mozambique	Zambia
30 t C ha^{-1}	3.74	3.89	7.43
45 t C ha^{-1} , 60.14 t C ha^{-1} for Zambia (baseline)	2.49	2.60	3.71
50 t C ha^{-1}	2.24	2.34	3.46
75t C ha^{-1}	1.50	1.56	2.97

4.5.3 Effect of changing the discount rate

Because of the long timeframe of the analysis, it is essential to assess how sensitive the analysis is to changes in the discount rate. A higher discount rate reduces the present value of alternative land uses, thus the opportunity cost of REDD+ (Table 12).

Table 12. Opportunity costs at different discount rates

Discount rate	Opportunity cost ($/t CO_2)		
	Namibia	Mozambique	Zambia
5%	3.88	3.77	5.25
7.5%	3.05	3.07	4.33
10% (baseline)	**2.49**	**2.60**	**3.71**
12.5%	2.10	2.26	3.27
20%	1.44	1.70	2.53

Without taking into account the timing of REDD+ payments, it is easy to interpret this result as meaning that REDD+ credits become cheaper with a higher discount rate. This is because we have not compared the discounted opportunity costs with the expected REDD+ revenues. The other interpretation of this is that land managers do not value the future benefits from land even under current uses such that once converted, future returns become less significant. The implication is that forests are only converted for immediate benefit rather than for future benefits.

4.5.4 Effect of increasing transaction and implementation costs

Increasing transaction and implementation costs increases the cost of REDD significantly (Table 13).

An accurate estimation of transaction and implementation costs is necessary to give landowners the appropriate level of compensation. As the total costs can be significant, REDD+ programmes need to plan within the range of costs suggested in Table 13. Assessments of actual costs on the ground will be necessary.

Table 13. Effect of transaction and implementation costs			
Transaction and implementation costs as a percentage of the opportunity cost of land	Opportunity cost ($/t CO_2)		
	Namibia	Mozambique	Zambia
12.5% (baseline)	2.49	2.60	3.71
25%	2.77	2.88	4.12
50%	3.32	3.46	4.94
75%	3.88	4.04	5.77
100%	4.43	4.62	6.59

4.6 Summary

The average opportunity costs for Africa have been estimated by other studies to be about $2.22/t CO_2 (Pagiola and Bosquet, 2009). For both Mozambique and Namibia, our baseline figures are closer to this earlier estimate. For Zambia, our results have a significantly higher opportunity cost. The value of charcoal is significantly high in Zambia, which pushes up the opportunity cost of REDD+ as payments have to compensate for this foregone value. It can be noted from these results that the price of carbon that would make REDD+ attractive is variable in the region, and it is expected to vary even within the same country. This analysis incorporated that values of land from agriculture, charcoal and timber only. If other benefits that REDD+ could exclude are incorporated, the opportunity costs may be higher. Despite these variations, there seem to be opportunities for achieving cost-effective REDD+ in a region with low carbon densities compared to other regions.

The economic opportunities of REDD+ are sensitive to changes in key variables. Because of data scarcity, it is difficult to put a level of confidence in the baseline figures used. Incorporating more countries in the region in the analysis would provide a better picture on the reliability of baseline results.

It should also be noted that the expected supply, and the associated supply curve, is only indicative and will be different from the actual supply as the estimations assume that all deforestation will stop. In reality, some deforestation will still continue to meet the demands of the countries as variables such as population, prices of commodities etc. change.

Even with its several weaknesses, this chapter has enabled this study to take the major step of taking analyses to the country level; with more time it is possible to apply more focused analyses in each country, which would enable the construction of within-country supply estimates. The key activity here would be empirical valuation of alternative land uses. Apart from providing supply-level data, this type of analysis is useful for country-level planning for REDD+, and is a useful approach for estimating the viable cost of REDD+ bottom–up.

Learning the lessons from CBNRM for REDD+

5.1 Introduction

During the early colonial period, there was widespread and unsustainable exploitation of resources – particularly wildlife – by white settlers and traders (Child, 2004; Fabricius 2004; Hulme and Murphree 2001). Governments responded by appropriating land some to form protected areas and private land. Legislation was also passed that limited peoples' access to and use of natural resources such as timber and wildlife. People who broke these laws were punished as criminals (Child, 2004; Fabricius *et al*., 2004; Hulme and Murphree, 2001).

The first few tentative steps towards devolution of the control of resources came in the mid-1970s, when the governments of Namibia and Zimbabwe devolved control over the use of wildlife to private (white) large-scale commercial farmers (Child, 1995; Jones and Murphree, 2001). However, from the mid- to late 1980s, the devolution of control over land and natural resources from central governments to local community-based units on communal land gained considerable momentum across the entire region[23] (Child, 2004; Fabricius *et al*., 2004; Hulme and Murphree, 2001).

This section of our report reviews the CBNRM experience from the perspective of future payments for reduced emissions from deforestation in the miombo woodlands of southern Africa.

5.2 Community-based natural resource management in southern Africa

'Community conservation' is generally considered as a broad spectrum of management arrangements that include protected area outreach, collaborative management and community based natural resource management (Barrow and Murphree, 2001). Of these different, but not mutually exclusive options, CBNRM is the strongest, seeking the sustainable management of natural resources through returning control over, or responsible authority for, these resources to the community (Barrow and Murphree, 2001; Roe *et al*., 2009). The CBNRM programmes in the region share a number of common and important characteristics:

- **Direct incentives for the management of natural resources:** There is a strong recognition in the region that conversion of indigenous woodlands to agriculture and settlements is driven by the economic needs of rural farmers.

23. The devolution of control was aided by: the rising influence of the sustainable development agenda; the re-emergence of the principles of decentralisation and community; changes in the development discourse to re-emphasise community; the domination of markets and market forces; and an improved understanding of conservation biology and genetics that showed that isolated pockets of species were not viable in the long term (Adams and Hulme, 2001).

Thus all the community-based programmes seek to generate both direct and indirect incentives for the management of common pool resources. In many of the wildlife-based programmes, direct cash incentives are created through the sale of commercial utilization rights to private sector tourism and international trophy-hunting companies (see Bond, 2001; NACSO, 2008; Child and Weaver, 2006). However, in many countries similar principles have been extended to forest and non-timber forest products (see Lund *et al.*, 2008).

- **Devolution through a legal and policy framework:** Generally the devolution that has allowed community-based conservation programmes to develop through legal and policy instruments that devolve rights and responsibilities to either local government (e.g. Zimbabwe) or defined community-based organizations (e.g. Namibia and Mozambique). While some of these frameworks may be insufficient (and in other cases conflict with other government policies) they have ensured that CBNRM programmes are *government* programmes as opposed to isolated projects.

- **Facilitated and implemented by partnerships and government and non-governmental organizations:** All of the major CBNRM programmes of eastern and southern Africa have been implemented by partnerships between government and non-governmental organizations. In addition, most of these programmes have received considerable support from international donor organizations. For example, it is estimated that in Zimbabwe, CAMPFIRE received donor support of at least US$35 million over a 15-year period between 1989 and 2004 (Frost and Bond, 2008).

5.3 Lessons from CBNRM for future REDD+ activities and projects

Two decades of CBNRM experience in the southern African region have been documented in a substantial body of formal and grey literature (for examples see Hulme and Murphree, 2001; Fabricius *et al.*, 2001; Child *et al.*, 2004; IIED, 2006; Child *et al.*, 2008; Frost and Bond, 2008). Within this body of literature numerous implementation principles have been recorded (e.g. CAMPFIRE Principles of CBNRM, Murphree 1997; Principles for Improving the chances of success of CBNRM initiatives, Shackleton, 2000), lessons learned (e.g. Dalal-Clayton and Child, 2003; Roe *et al.*, 2009) tools and toolkits (e.g. Child and Jones, 2003).

Climate change and its links with deforestation and land-use change are a new issue on the conservation and development agenda in the region. The following section of our report examines some of the lessons learned from the collective CBNRM experience that will be applicable to REDD+.[24] In this context REDD+

24. The UNFCCC definition of REDD+ is 'Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries' (http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3)

Table 14. Summary of the main CBNRM programmes in southern and eastern Africa

Country	Programme	Scale		
		Area	People	Date Initiated
Botswana[25]	Community-based natural resource management (CBNRM)		135,000	Started: 1990 Legislation: *Wildlife Conservation and National Parks Act* (1997)
Mozambique[26]	No over-arching description or name of the programme	In 2003, there were approximately 42 individual CBNRM project sites, both terrestrial and marine		Forestry and Wildlife Law of 1999
Namibia[27]	Community-based natural resource management (CBNRM)	118,704 km^2	220,620	Started: 1980s Legislation: 1996
Tanzania	Community-based forest management (CBFM)	36,700 km^2	1,821 villages	Started: 1990s Legislation: 2002
Zambia[28]	Luangwa Integrated Rural Development Programme (LIRDP)/Administrative Management Design for Game Management Areas programme (ADMADE)	15,000 km^2	+/- 45,000 people	Started: 1986
Zimbabwe[29]	Communal Areas Management Programme for Indigenous Resources (CAMPFIRE)	>33,000 km^2	>110,000 households	Started: 1989 Legislation: 1989

Source: Various

has been interpreted as a largely economic tool, which will involve developed countries meeting the full costs (opportunity, implementation and transaction) of avoided deforestation and land-use change in the region (Angelsen *et al.*, 2008; Bond *et al.*, 2009)[30]. REDD+ will also involve measures that improve the governance of woodlands and the application of existing 'policies and measures' (Dutschke *et al*, 2008).

25. CBNRM Status Report, IUCN (2006).
26. Nhantumbo *et al.* (2003).
27. NACSO (2008).
28. Child (2004).
29. Frost and Bond (2008).
30. The lessons were identified and prioritized by the participants in the second workshop facilitated by the IIED miombo project funded by PROFOR in Johannesburg, April 2009.

5.3.1 Financial benefits must accrue directly to farmers who bear the opportunity and implementation costs of REDD+ projects

The financial incentives in CBNRM programmes are essential to changing the way farmers use land and perceive wildlife (Martin, 1986; Bond, 2001; Child, 2004). The revenues from wildlife at community level also meet the direct and indirect costs of co-management activities as well as providing a rationale around which the political economy of a community can be restructured (Child, 2006).

Community-based organizations receiving payments for REDD+ should have a high degree of proprietorship over the revenues so that it can be equated with other forms of income such as crop and livestock sales (Bond, 2001). This is seldom achieved when revenues are devolved to communities via government because it becomes mired in administration, and the burden of proof and accountability is often excessive (see Chundama, 2009; Nhantumbo and Izidine, 2009). A major challenge for REDD+ will be to devise supply chains that link communities directly with international carbon markets or international funds thereby avoiding the numerous problems that have faced CBNRM programmes that devolve revenue to communities through government or quasi-government organizations.

5.3.2 Benefiting communities must be allowed a high degree of autonomy in how financial benefits are used and shared

The CBNRM experience has shown that governments and units of local government are reluctant to allow communities to have both proprietorship and flexibility over the use of revenue from wildlife at community level (Child, 2006; Bond, 2001; Murphree, 1997). However, the ability for communities to allocate these revenues to local needs and priorities and for these to change over time is an integral part of their value (see Bond *et al.*, 2009). Recently the government of Botswana has recentralized a substantial proportion of the wildlife revenues, using the argument that they were not be effectively utilized by the recipient communities (Roe *et al.*, 2009).

The architecture for REDD+ payments at the national and sub-national levels should focus on negotiating a set of principles by which communities and farmers receive revenue. These must be broad and avoid being too prescriptive as this negates their perceived value and the sense proprietorship of the community. Over time and with the right support, communities will work out how best to allocate the resources at their disposal. Mistakes will occur and errors of judgement will be made but this does not negate the principle that the decision making about how benefits are allocated should be done at community level.

5.3.3 Community-led conservation activities need to be innovative and flexible so that they can be adapted to local circumstances

The experience of CBNRM in southern Africa is frequently described in terms of programmes, e.g. CAMPFIRE in Zimbabwe or Communal Land Conservancies in Namibia. The building blocks of the programmes are the individual community-based organizations in the communal lands (110 wards in Zimbabwe or the 55+ registered conservancies in Namibia). Each community organization represents a unique set of biophysical resources, economic opportunities, social challenges and governance issues (Murphree and Taylor, 2009; Frost and Bond, 2008). Recognizing the need for flexibility that allows innovation at the community level has been on of the strengths of the CBNRM programmes in southern Africa.

The design of future REDD+ programmes in the region and elsewhere must recognize the advantages that a framework approach will bring. There is a danger that the potential scale of the economic incentives for REDD+ will lead to governments being highly prescriptive and in some cases alienating forest-dependent communities (Cotula and Mayers, 2009). This must be avoided in favour of frameworks that recognize the challenges and opportunities presented by the inherent diversity between communities but that place communities at the centre of decision making (Murphree and Taylor, 2009)

5.3.4 Community-based natural resource management programmes in the miombo region need to be based on solid foundation of common property theory

To varying degrees the CBNRM programmes in the region have been developed using common property theory (Balint and Bond, unpublished; Fabricius *et al*., 2004). In turn, these programmes have also made substantial contributions to the evolution of common property theory and practice (Child *et al*., 2009). The Namibian CBNRM programme in particular embodies key elements of the common property theory such as defined membership and geographical boundaries, agreed operating and resource use rules, and the ability to monitor and enforce these rules (Jones and Weaver, 2009). The embodiment of these principles has been proposed as one of the reasons why this particular programme is so successful (Balint and Bond, unpublished).

Payments for REDD+ in the communal lands of the miombo region will face a similar set of challenges to current CBNRM programmes. These include the management of land and resources that are nominally under common-pool authority but which face many external challenges (Roe *et al*., 2009). The designers and architects of future REDD+ programmes need to consider the very pragmatic common-pool design principles (Bromley and Cernea, 1989; Ostrom, 1990) as well as the collective lessons learned from those programmes such as CBNRM that have used them. A further design lesson from Namibia is the importance of dialogue and consultation with the communities. The changes in

legislation in Namibia were preceded by an extended period of consultation by government and NGOs with community representatives before the changes were made (Jones and Murphree, 2001).

5.3.5 Viable, cost-effective and sustainable community-based monitoring systems need to be developed

The recent history of land and natural resource management (forestry, fisheries and wildlife) has many spectacular failures (see Ludwig *et al.*, 1993; Holling *et al.*, 1978). Many of these have been caused by the dysfunctional relationship between monitoring and policy formulation. This means that the results of monitoring, which is often showing declining stocks, are not considered when policy is being made (Taylor, 2001). Monitoring and its links with policy are central to many of the wildlife-based CBNRM programmes because of their reliance on trophy hunting (Rigava *et al.*, 2006). The major lesson that emerges from the CBNRM experiences is that new approaches to monitoring and its links with policy have to be developed (see Goredema *et al.*, 2005; Stuart-Hill *et al.*, 2006). These type of innovations take time, skills and resources to develop as has happened both in Namibia and Zimbabwe (opp. cit.). But crucially the development of these tools and approaches needs to be done with the participation of the end users (the communities) and the policy makers (government line ministries and departments).

Robust monitoring of woodlands and forests is central to REDD+ and to the eventual development of global carbon markets. The carbon emissions and the contribution to climate change mitigation will only be real if the changes are additional, permanent and there is no leakage (Wertz-Kanounnikoff and Verchot, 2008). A lot of emphasis is being given to remote sensing techniques as these are the only practical way of monitoring large areas of forest. There is also recognition that these will have to be complemented by ground-based methods undertaken by community management organizations (Wertz-Kanounnikoff and Verchot, 2008; Bond *et al.*, 2009).

5.3.6 Linking policy with practice nationally and internationally

Pilot community initiatives were critical to the development of the future legal and policy frameworks for CBRNM. Without these pilots it is unlikely that full-scale implementation across the miombo region would have been possible. In Namibia the CBNRM programme was based on the experience of community game guards initiated in the Kunene and Caprivi Regions (Jones and Murphree, 2001; Jones and Mazambani, 2007). In both Mozambique (Tchuma Tchatu) and Zambia (LIRDP) were equally important in providing policy makers with tangible experiences upon which need approaches could be built (Nhantumbo and Anstey, 2009; Dalal-Clayton and Child, 2003). In both Namibia and Zimbabwe CBNRM was strongly influenced by the lessons learned from wildlife management by private landholders (Bond *et al.*, 2004).

Since the early successes of 1990s, the trajectory of policy processes across the region has diverged considerably. Within Namibia, strong links between policy makers and conservancies is allowing ongoing devolution of rights and responsibilities. Conversely in Zimbabwe, there was a long period during which government embarked on re-centralizing power despite independent and well-documented evidence that CAMPFIRE was improving livelihoods and wildlife management (Bond and Cumming, 2006). More recently in Zambia, policy processes that promote devolution of forest and wildlife management have stalled (Chundama, 2009).

These experiences have several lessons for the design of REDD+ in the miombo region. Firstly, the evidence from pilot community-based activities for the management of carbon will be valuable in terms of future policy formulation. Currently there are too few examples with an over-emphasis on just one project – the Nhambita Carbon project, Mozambique. Secondly, proponents will need to use pilots to physically demonstrate the opportunities and limits of community-based woodland management in the context of REDD+. Finally, the region's experience will need to be fed into government negotiating teams so that the specific regional experience is recognized within the international negotiating processes that is currently dominated by the tropical forest nations (Brazil, Indonesia and Papua New Guinea) and highly developed industrialized countries – the USA and Japan – as well as the EU.

5.3.7 Supporting education, training and curriculum development for conservation and development

Child (2009) argues that conservation in the region has progressed through three phases. These are: an open access regime, strong state management, and now co-management by governments and communities. Within this evolution and particularly in the current phase of CBNRM the role of the 'scholar-practitioner' is critical. However, it is only relatively recently that the education system has recognized that the region needs people with a multi-disciplinary skills to continue leading and managing these programmes. Too much of the education system, particularly at tertiary level, is still focused on training single discipline specialists, i.e. biologists, economists or anthropologists (Child, pers. comm.). There are very few organizations or institutes that offer individuals the opportunity to develop a range of skills necessary to effectively address the multi-disciplinary challenges that exist in the real world.

Many of the donors supporting CBNRM programmes in the region provided funding opportunities for postgraduate studies that allowed students to develop multi-disciplinary skills (Frost and Bond, 2008). It is only more recently that substantive efforts are being made to develop curricula for mainstream education at secondary and tertiary levels (Child, pers. comm).

The importance of training, skills and capacity for REDD+ has already been recognized at an international level. One estimate is that it will require an investment of between US$14 million and US$92 million for five years in just 25 key tropical forest countries (Hoare *et al*., 2008). These estimates do not include the main countries in the miombo region. Proponents of REDD+ in the region need to recognize that the CBNRM community was slow to develop mainstream educational opportunities for people to develop multi-disciplinary skills. However, current efforts provide a good opportunity to start building curricula and training materials for both CBNRM and REDD+.

5.3.8 The governance of community-based organisations – separating executive and representative functions

Because of the emphasis on economic instrumentalism the initial focus of many of the organizations supporting CBNRM was on demonstrating and realizing financial benefits from wildlife (Child, 2006). More recently the governance of community-based organizations has been emerging as a major challenge to the effective management of resources and the equitable distribution of the benefits from wildlife (Child *et al*., 2007). A common characteristic of community-based organizations in the region is that the executive activities and the representative functions are blurred in an effort to keep costs down. This means that community representatives also fulfil executive functions such as the CBO secretary or treasurer etc. In addition to the governance problems this creates, elected representatives can also be voted out of office and are then unwilling to continue in their voluntary executive roles.

In some of the communal land conservancies of Namibia this challenge has been solved by having a very clear separation of roles. The elected representatives make the decisions but management activities are carried out by people who are employed by the community (Balint and Bond, unpublished). In addition to separating the roles this also means that training can be given to people who, within the limits of a community-based organization, can develop a career.

The importance of governance has been recognized as a crucial factor for the success of REDD+. It is more commonly discussed in the context of national governance and whether payments for REDD+ will be effective when it is weak (Bond *et al*., 2009; Cotula and Mayers, 2009). Within the miombo region, the lessons and experience of governance of community-based organizations must be incorporated into future planning (see Jones, 2004). In planning for REDD+ in the miombo region, stakeholders need to recognize and build on existing community architecture rather than creating parallel organizations as has happened in Namibia (Jones and Barnes, 2009).

5.3.9 Complex and flexible programmes need to be developed and implemented by collaborative partnerships

The previous eight points have directly and indirectly referred to the complexity of CBNRM programmes in the region. These lessons imply that these and similar programmes cannot be implemented by one or two organizations alone. For example, the analysis has reflected the importance of monitoring, supply chains, training, education and governance, as well as research and development. Past experience in Zimbabwe and current experience in Namibia suggest that collaboration between organizations is much more likely to be effective than the efforts by a single agency. In Zimbabwe, the CAMPFIRE Collaborative Group comprised of government departments, civil society and donors, and lead by the CAMPFIRE Association, coordinated the multi-donor activities worth about US$40 million over ten years (see Frost and Bond, 2008). In Namibia this role has been played by NACSO, the Namibian Association of Conservancy Support Organisations. These multi-agency partnerships have also been crucial in lessons learning and adaptive management at the national level and in providing legitimate programme representation at the international level.

The broad framework for REDD+ is only likely to emerge from the UNFCCC Copenhagen COP. The details and the implementation of this framework are likely to take several years. During this period, it is very unlikely that REDD+ activities in the miombo region will approach the scale of past and current CBNRM programmes. Therefore the opportunities for the kind of multi-agency partnerships outlined here are probably some way off. However, if and when the need arises, we strongly recommend that the lessons of collaboration are remembered.

5.4 Summary

This section has taken some of the broad lessons learned from CBNRM and considered them from the perspective of what might be needed in the future for the implementation of REDD+ in the miombo region. Some of the lessons are relevant to the design of REDD+ in the region, for example the importance to getting payments to communities and letting them decide how to allocate and use them. Others are proactive but at a broader level such as ensuring the ongoing research and development for monitoring or linking policy development at local, national and international levels. The analysis suggests that there are also several opportunities where future REDD+ activities can build on the existing CBNRM processes and architecture. This will save both time and money that will be a major part of developing REDD+ in locations where these kinds of opportunities don't exist.

Conclusion – lessons for making REDD+ pro-poor in the miombo region

6.1 Introduction

Macro-level indicators show that the main countries in the miombo region are largely poor, with small, albeit in some cases growing economies (World Bank, 2008). However, key indicators from the region show that poverty is deeply entrenched and has proven very difficult to address (Collier, 2007).

Most rural households in miombo ecosystems derive an important but variable proportion of their livelihoods from the woodlands. Household wealth determines the extent to which households depend on woodland resources. The quality of the preceding wet or rainy seasons and location within the region also affect the dependence on woodland resources (Campbell *et al*., 2002). More recently the spread of HIV/AIDs is a stress that has led to greater dependence by affected households on woodland resources (see Campbell *et al*., 2007).

Our study has considered three main topics:

- **The legal and policy frameworks for the management of land and natural resources in Mozambique, Namibia and Zambia:** The analysis shows that progress has been made in devolving rights to communities so that they are able to begin playing an active role in the management of their land and natural resources.

- **The opportunity costs of land use:** The analysis of the opportunity costs of REDD+ in Chapter 4 shows that the three countries in the study have very different potential to benefit from future REDD+ mechanisms. In the Caprivi Strip of Namibia where deforestation rates are very low the potential net benefits from REDD+ are low. Conversely in Zambia where deforestation rates are high potential transfer could be significant.

- **Implementation lessons from CBNRM:** In all three countries there is a wealth of experience and lessons to be learned from the implementation of CBNRM programmes. There are clear opportunities for future REDD+ activities to use the existing skills and experience as well as some of the community architecture that exists.

Addressing poverty and making sustainable positive changes to livelihoods is the major challenge for the region. The implementation of REDD+ will only be possible if rural households see net benefits from not extending cultivation or restricting immigration into wooded areas.

The final section of this document uses the foregoing analysis to develop eight guiding lessons for the implement 'pro-poor REDD+' in southern Africa. It draws together the main areas of investigation in this report namely: the legal and policy frameworks, the analysis of the costs of REDD+ in the miombo region, and the lessons learned from CBNRM.

6.1.1 What does it mean to be pro-poor?

Payments for avoided deforestation could be a source of new benefits to poor people; these could be neutral or they could provide a whole new set of risks and substantially damage poor people's livelihoods (Peskett *et al.*, 2008). The final design of REDD+, which is still very unclear, will have a major bearing on the interface between REDD+ and livelihoods. For example, regulated markets are likely to involve larger financial flows, will be more focused on efficiency rather than equity and therefore targeted at major rainforest nations with high rates of deforestation such as Indonesia and Brazil. The alternative to markets is the fund-based approach. It is unlikely that dedicated forest funds will generate as much revenue, but as a tool they present the option of much greater flexibility and hence the possibility of addressing issues other than efficiency and the mitigation of carbon dioxide production from forests (Peskett *et al.*, 2008). It is very likely that the main sources of REDD+ finance for the miombo region will come from either multilateral or bilateral funds in the next decade until robust monitoring, reporting and verification systems can be put in place.

Photo: Muyeye Chambwera

Selling charcoal to meet immediate needs, Zambia

The experience from the voluntary carbon market and the Nhambita Community Carbon Project in Nhambita provide a small insight into current experiences. An analysis of the livelihood benefits shows that carbon payments to participating households supplement existing sources of household income, albeit that the payments are for afforestation type activities (Jindal, 2008). The households that benefit most are those that are engaged and are earning regular wages in associated micro-enterprises (Jindal, 2008). REDD+ type payments for the management of common woodland has earned the community revenue that has been invested in community facilities. The analysis notes the importance however of other changes in the community that can be attributed to the project such as improved cash cropping, better health and education facilities (Jindal, 2008).

Because immediate and urgent action is required to prevent climate change, it is often argued that mitigation activities should not be burdened with additional objectives such as addressing poverty and biodiversity (Peskett *et al.*, 2008). However, aside from the efficiency and moral arguments, unless REDD+ is pro-poor in southern Africa it is unlikely to be successful because so much of the deforestation is being done by poor people. The linkages between poor people and their environment are by nature complex and frequently over-simplified. In our concluding chapter, we use a broad interpretation of pro-poor that is simply any policy that aims to increase the 'assets and the capability of the poor' (Curran and de Renzio, 2006).[31]

6.1.2 Has CBNRM in the region been pro-poor?

Before using CBNRM experience to advocate design principles for pro-poor REDD+ in the region it is necessary to assess the impact that CBNRM itself has had on poverty. In 2001, it was noted that such data did not exist (Hulme and Murphree, 2001). In 2009, the paucity of data with respect to CBNRM's impact on poverty in sub-Saharan Africa is still an issue (Roe *et al.*, 2009). The more recent study notes that 'from an individual household livelihood perspective it is now accepted that contemporary CBNRM initiatives can provide limited and supplementary sources of income. There are a few, often well documented, exceptions, where the benefits per household can be very high' (Roe *et al.*, 2009). The Kunene region of north-west Namibia is one example of a region where there is substantive quantitative evidence that CBNRM has improved livelihoods (Bandyopadhyay *et al.*, 2008).

As in the Nhambita Carbon Project, poverty and livelihood analyses of CBNRM in southern Africa often emphasise the indirect developmental benefits such as governance of community-based organizations, community services and infrastructure, and skills and training that have been delivered as an integral part of CBNRM in the region (Child, 2004; Fabricius *et al.*, 2004; Child *et al.*, 2008).

31. This can be broken down into i. income and growth; ii. equity; and iii. voice and choice (see Peskett *et al.*, 2008).

6.2 Making REDD+ pro-poor in the miombo region

This report has emphasized that miombo woodlands are an important source of goods and services for many rural households across the region but that woodland use itself will not alleviate poverty (Campbell *et al.*, 2007). We have also noted that our understanding of carbon cycles in miombo woodlands is poorly developed. Some uses such as clearing and settlement will have a negative impact on the amount of carbon stored, but other uses such as the collection of fruits, mushrooms, leafy vegetables and medicines, or the harvest of insects and wildlife, have little or no impact on carbon cycles.

At a generic level, there is already guidance as to how REDD+ could be made to work for the poor (see Box 2).

Box 2. Making REDD+ pro-poor

- Providing information on the technical complexity of REDD+
- Providing upfront financing to meet some of the costs
- Using soft (rather than hard) enforcement measures
- Prioritizing pro-poor REDD+ policies and taking a long time horizon
- Providing legal and technical assistance to all stakeholders
- Ensuring that REDD+ is a flexible tool
- Ensuring that there are clear and equitable rights to carbon
- Developing social standards that can be applied to REDD+
- Developing measures to improve the equity of benefit distribution
- Aligning REDD+ with international and national development strategies

Source: Peskett *et al.* (2008)

The suggestions for making REDD+ pro-poor in the miombo region recognizes the ten clear requirements provided by PEP. There is necessarily some overlap between the two sets of recommendations. For example, both sets of recommendations recognize the importance of information, the provision of clear and defined rights to land, resources and carbon, and the issue of flexibility.

6.2.1 Legal and policy frameworks for pro-poor REDD+

The review of current systems of land and natural resource tenure in three countries in the miombo region shows that:

- Policy cycles change in the region is discrete rather than continuous
- Changes tend to be sector specific
- There is a trend towards devolved management for land and natural resources

The CBNRM programmes in the region are generally being developed in a framework that allows for a degree of devolved management of specific resources such as forest products and wildlife. However, land as the key resource still tends to be controlled by the state, but often allocated by traditional leaders. Consequently rights tend to be contested and communities do not have strong control over land or resources. The rights to carbon are a new issue that has not been resolved. In this context the CBNRM experience does provide both positive

and negative lessons on how partial the devolution of rights can be. While a compromise involving partial rights might be sufficient to allow programmes to develop, the CBNRM experience shows that it is very difficult to translate partial rights into a full set of rights at a later date.

Lesson 1: Pro-poor REDD+ that has long-term success in reducing the rates of deforestation will only be achieved when the rights to land, resources and carbon are clarified and reside with farmers and communities.

The legal and policy review noted that changes to legislation tend to be sector specific and that this becomes a challenge to the implementation of programmes in which the management of intact landscapes in the objective. This is because agriculture is the primary source of household income but is often supplemented by varying levels of woodland resources (Campbell, 2007). Pro-poor REDD+ in the region will have to be developed in a policy framework that is consistent across all sectors and recognizes the centrality and importance of agriculture to people's livelihoods. This will be extremely challenging in a culture where the productive use of land is closely aligned to agriculture, development and national food security (Bond and Cumming, 2006).

Lesson 2: Pro-poor REDD+ that has long-term success in reducing the rates of deforestation will only be achieved if and when there are legal and policy frameworks in place that value and reward land uses other than agriculture.

The existing legal frameworks and the community-based organizations that have been developed in all three countries considered can provide a foundation for REDD+ pilot projects and programmes in the region. However, these pilots should recognize the limitations of the existing frameworks and that they were not developed with an explicitly pro-poor agenda in mind.

6.2.2 The opportunity costs of land use

The opportunity cost of land use varies considerably in the region as demonstrated by the simplified analyses this study carried out. Namibia and Mozambique have opportunity costs of $2.49 and $2.60 per tonne of carbon dioxide respectively while Zambia's opportunity cost is $3.71 per tonne of carbon dioxide equivalent. The potential of the three countries in the study to earn REDD+ revenues also varies considerably. In the semi arid Caprivi Strip of Namibia where the deforestation rates are low, the revenues are low. At the other extreme, Zambia has the highest potential to earn REDD+ revenues if it can reduce its high rate of deforestation. At prices equal to the opportunity costs of land use, Namibia, Mozambique and Zambia are able to supply 3.3 million t CO_2/annum, 9.8 million t CO_2/annum and 26.78 million t CO_2/annum respectively.

Lesson 3: Opportunity costs are highly variable by country and even within the same country, and the local circumstances will dictate the actual price at which the supply of carbon credits is guaranteed.

The opportunity cost of REDD+ is very sensitive to the main uses of the woodlands. For example, in Zambia, where woodlands are used for agriculture, timber and the production of charcoal, opportunity costs are high. In semi-arid Namibia, woodlands are not used for the production of charcoal and timber, and the opportunity costs are lower.

Lesson 4: Pro-poor REDD+ that has long-term success in reducing the rates of deforestation will only be achieved if farmers are compensated for the full range of woodland uses such clearing for agriculture; timber and energy (charcoal).

6.2.3 Implementation lessons for pro-poor REDD+

Within the three countries there is almost two decades of experience on the implementation of CBNRM programmes. Although these programmes initially focused on wildlife management many have diversified into other natural resources such as non-timber forest products and valuable plant species.

In their implementation it soon became apparent that it was necessary to address a much wider range of issues such as livelihoods, governance issues and development challenges more generally (Frost and Bond, 2008). Most of the programmes have been careful not to develop a template approach to implementation but have allowed communities and local governments to craft their activities within a broad set of implementation principles. REDD+ is a global initiative and there is a danger that REDD+ activities prescribed will not accommodate local realities, especially those of poor people. Pro-poor REDD+ for the miombo will have to be flexible in its implementation so that it can be designed by local communities to meet local development and conservation issues.

Lesson 5: Pro-poor REDD+ that has long-term success in reducing the rates of deforestation will only be achieved if the implementation allows communities, local government and supporting organizations to adapt activities to meet local conditions.

The loss of miombo woodlands is contributing to global carbon dioxide production and therefore to global climate change. As a proportion of global carbon dioxide production, however, the emissions are low compared with some tropical countries. For example, deforestation in Zambia accounts for just 3 per cent of total GHG production (http://www.eia-global.org/PDF/EIA_REDD+PoznanBriefing.pdf). However, within Africa the miombo region lies in the area that is will be most affected by climate change. This means that in 100 years' time, areas considered to be prime agricultural land could be suitable only for extensive livestock production.

Countries will therefore need to explore their responses to both climate mitigation through the management of the miombo woodlands but also to consider what adaptation measures will be needed to deal with the impacts of climate change. Careful planning with local communities and activities demonstrating the benefits from both mitigation and adaptation are will be critical in dealing with both aspects of climate change. The diversity and complexity of the woodlands will need to be carefully considered to avoid mitigation and adaptation activities from undermining each other. Extractive uses such as charcoal making will have different impacts from uses such as beekeeping and mushroom collection, while wildlife provides a resilient multi-species-based option that utilizes the unique fauna of the region (Child, 2004; Bond *et al.*, 2004).

Lesson 6: Pro-poor REDD+ that has long-term success in reducing the rates of deforestation will only be achieved if implementation recognizes the potentially severe impacts of climate change on ecosystems, agriculture and livelihoods in the region.

The analysis of governance within CBNRM has tended to focus on identifying the appropriate scale for the management of wildlife 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.*, 2009). Pro-poor implementation of REDD+ in the miombo region will 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. As recent political events in the region have shown, governance systems can also change very rapidly in both directions (Zimbabwe – negative; Mozambique – positive).

Lesson 7: Pro-poor REDD+ that has long-term success in reducing the rates of deforestation will only be achieved if it is able to address the underlying governance challenges at all scales.

6.3 Summary and conclusions

There are huge numbers of poor people in the countries that constitute the miombo region. For many of these people, part or all of their livelihoods depend on the goods and services provided by miombo woodlands. Our knowledge of the carbon cycles in these diverse and complex ecosystems are limited and interventions will mean making trade-offs between different services. In this complex and challenging situation, pro-poor REDD+ can start by taking a position of 'doing no harm'. For example, new legislation and policy changes should be specifically looked at in terms of their likely impacts on the assets and the capability of the poorest households. Understanding livelihoods, economic systems and developing baselines in areas in which REDD+ will be implemented will contribute to the design but will also provide the data against which it is possible to measure changes (Peskett *el al.*, 2008). The absence of robust livelihood baselines and quantitative impacts on livelihoods has been an ongoing constraint to the analysis of many of the CBNRM programmes in the region (Roe *et al.*, 2009).

While the principle of doing no harm is eminently sensible there are other constraints that will have to be dealt with. There is a limited pool of skilled people to develop, implement, monitor and analyse the impacts of REDD+ in the region. The pro-poor requirements identified by Peskett *et al.* (2008), such as the provision of legal and technical assistance or the development of standards, will all require a massive investment in people and training and, in the end, depend on recognition by government that REDD+ will not work unless it also deals with people's fragile livelihoods.

Although poverty is deeply entrenched across the region, this report demonstrates that there is an important and current set of experiences and architecture upon which REDD+ activities can be developed. In addition, there are considerable economies of scale through regional cooperation thereby providing scope for reducing implementation. The CBNRM programmes in Botswana Mozambique, Namibia, Zambia and Zimbabwe developed a strong ethos of shared learning and innovation (one example being the Southern African Sustainable Use Group (see Child *et al.*, 2009 and Child *et al.*, 2004)). For example, sharing lessons between countries, particularly helped Namibia's CBNRM programme avoid some significant problems and capitalize on the strengths of other programmes (Bond, 2001). There has also been a strong commitment by the national programmes to sharing new approaches and methodologies with each other – thereby saving research and development costs (see Child and Jones, 2006). Regional cooperation for REDD+ will also be facilitated by the strong and emerging paradigm of trans-boundary natural resource management programmes (TBNRM). TBNRM recognize that landscape-level conservation and development has to take place across national boundaries and include different land holders, thereby providing a model for active regional cooperation for future REDD+ programmes. Generic tools, procedures and standards for implementation of REDD+ can also be developed and shared regionally, thereby reducing the costs of duplicating the development of the same tools in each country.

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REDD+ in dryland forests

Issues and prospects for pro-poor REDD in the miombo woodlands of southern Africa

International exploration is underway for ways to achieve Reduced Emissions from Deforestation and forest Degradation, and enhanced forest carbon stocks, in developing countries (REDD+). Implementing REDD+ will involve providing sufficient incentives to land users and a supportive policy, legal and institutional environment. Community-based natural resources management (CBNRM) in the miombo ecoregion of east and southern Africa has been grappling with these issues for many years, with considerable success. The lessons from this experience provide a basis on which REDD+ in dry-land forests can build.

The Program on Forests (PROFOR) supported a research project run by the International Institute for Environment and Development (IIED) to explore the issues facing a REDD+ program in the miombo ecoregion. Three country case studies, of Zambia, Mozambique and Namibia, provided relevant lessons from CBNRM and on how CBNRM could inform pro-poor REDD+. The study finds that, in a region where poverty is high and is a key driver of land use change, REDD+ mechanisms need to be explicitly pro-poor – building the assets and capability of the poorest households at policy level and in practice. They also need to pay for the value of land uses that the poor could have otherwise pursued in the absence of REDD+ and the costs of facilitating REDD+ in environments where forest resources are often jointly owned or managed by communities. These costs are highly variable across the region. REDD+ pilot initiatives should be encouraged, but should ensure that concerted analysis and adaptation to the complexity of the challenges is built in.

Natural Resource Issues No. 21

ISBN: 978-1-84369-764-0
ISSN: 1605-1017

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International Institute for Environment and Development

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