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Almeida Siteo

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Center for International Forestry Research

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Field of baobab trees near Pemba Bay

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Table of contents

Abbreviations	vi
Summary	viii
Resumo	xi
Acknowledgements	xv
Introduction	xvi
1 Forests, land-use trends and drivers of deforestation and forest degradation	1
1.1 Current forest cover and historical changes	1
1.2 Review of the main drivers of forest-cover change in Mozambique	7
1.3 Potential for mitigation	21
1.4 Capacity to monitor deforestation and forest degradation	24
2 Institutional framework and distributive aspects	25
2.1 Governance in the forest margins	25
2.2 Decentralisation policies and benefit sharing	26
2.3 Land tenure rights, forest and carbon	28
3 The political economy of deforestation and forest degradation	31
3.1 Overview of the national economy	31
3.2 National development priorities	32
4 The political context for REDD+: Actors, events and political processes	35
4.1 Political context for climate change	35
4.2 Actors, events and political processes related to REDD+	35
4.3 Process of consultation and platform of stakeholders	36
4.4 Policy options and future processes for REDD+	41
5 Implications for the effectiveness, efficiency and equity of REDD+	42
5.1 National policies and political options	42
5.2 Considerations on the effectiveness, efficiency and equity of the main aspects of REDD+	43
6 References	47

List of figures, tables and boxes

Figures

1	Mozambique's forest cover in 2007	1
2	Map of the different types of natural vegetation in Mozambique	3
3	Risk zones for deforestation and forest degradation for the sustainable supply of firewood and charcoal to the cities of Maputo and Matola	8
4	Dynamics of land-use and forest-cover changes, Beira Corridor	11
5	Cultivated area of staple food crops and cash crops in 2009/10	13
6	Volume licensed of simple licenses and forest concessions in 2009	18
7	Distribution of fire spots from 1 January to 31 December 2008	20
8	Process of REDD+ in Mozambique, 2007–2012	38
9	Structure of coordination of working group on REDD+ in the context of South-South cooperation	39

Tables

1	Simplified classification of the types of forest cover (2005)	2
2	Classification of forest types based on their use	3
3	Estimates of forest cover and deforestation in Mozambique	5
4	Estimates of deforestation rate by province, 1990–2002	6
5	Estimates of forest degradation in some regions in Mozambique	7
6	Major studies on the production and consumption of fuel wood in Mozambique	9
7	Area of staple food crops in 2001–2010	11
8	Areas of production of the three main cash crops in 2000–2010	14
9	Changes in cultivated areas for the main staple food crops and cash crops, 2000/01 to 2009/10	15
10	Main characteristics of the two regimes of forest management in Mozambique	16
11	Number of forest concessions issued per year, 1998–2010	18
12	Main mining projects in Mozambique	21
13	Assessment of the mitigation potential of the major sources of forest cover change in Mozambique	22
14	Initiatives to develop skills for measuring, monitoring and verification of carbon stocks and forest-cover changes in Mozambique	24
15	Main international conventions ratified	25
16	Instruments for decentralisation and its implementation in practice	27
17	Some indicators of socio-economic development in Mozambique	31

18	Overview of key policy priorities in sectors that affect forest-cover change in Mozambique	33
19	Main political events of REDD+ in Mozambique	37
20	List of the main actors involved in the REDD+ process in Mozambique	39
21	Consultations on the national strategy on REDD+ and training on forests and climate change	40
22	Participants in the consultations and training events	40
23	Key elements of the REDD+ proposal	41
24	Main causes of forest-cover change in Mozambique	42
25	Evaluation of the most important aspects of REDD+ for effectiveness, efficiency and equity	44

Boxes

1	Calculation of deforestation rate	4
2	Production and consumption of fuel wood in urban zones versus rural zones	9
3	Historical antecedents of agriculture in Mozambique	12
4	The cultivation of tobacco in Mozambique	13
5	Historical background of the forest sector in Mozambique	16
6	Memorandum of Understanding between the Government of Mozambique (through MICOA) and the Amazonas Sustainable Foundation (FAS), Brazil	36

Abbreviations

ALOS PALSAR	Advanced Land Observing Satellite Phased Array type L-band Synthetic Aperture Radar
CBD	United Nations Convention on Biological Diversity
CDM	Clean Development Mechanism
CFJJ	Centro de Formação Jurídica e Judiciária (Center for Legal and Judicial Training)
CITES	Convention on International Trade of Endangered Species
CO ₂	carbon dioxide
CONDES	Conselho Nacional de Desenvolvimento Sustentado (National Council for Sustainable Development)
CTV	Centro Terra Viva
DMC	diametro minimo de corte
DNFFB	Direcção Nacional de Florestas e Fauna Bravia (National Directorate for Forests and Wildlife)
DNTF	Direcção Nacional de Terras e Florestas (National Directorate for Lands and Forests)
DUAF	Direito de Uso e Aproveitamento de Florestas (Forest Use and Benefit Rights Certificate)
DUAT	Direito de Uso e Aproveitamento da Terra (Land Use Rights Certificate)
EN-REDD+	REDD+ National Strategy
FAO	Food and Agricultural Organization of the United Nations
FAS	Fundação Amazônia Sustentável (Sustainable Amazon Foundation)
FCPF	Forest Carbon Partnership Facility
FNI	Fundo Nacional de Investigação (National Research Fund)
FP7	Seventh Framework Program of the European Union
FRA	Forest Resource Assessment
IFN	Inventário Florestal Nacional (National Forest Inventory)
IIED	International Institute for Environment and Development
INGC	Instituto Nacional de Gestão de Calamidades (National Institute of Disaster Management)
IPCC	Intergovernmental Panel on Climate Change
ITIE	Iniciativa de Transparência da Indústria Extractiva (Industry Transparency Initiative)
JICA	Japanese International Cooperation Agency
LOLE	Lei dos Órgãos Locais do Estado (Law of Local Organs of the State)

MICOA	Ministério para a Coordenação da Acção Ambiental (Ministry for Environmental Coordination)
MINAG	Ministério da Agricultura (Ministry of Agriculture)
MINEC	Ministério de Negócios Estrangeiros e Cooperação (Ministry of Foreign Affairs and Cooperation)
MRV	Monitoring, Reporting and Verification
MZN	Mozambican metical
NAPA	National Action Plan for Adaptation
PAPA	Plano de Acção para Produção de Alimentos (Food Production Action Plan)
PARP	Plano de Acção para a Redução da Pobreza (Poverty Reduction Action Plan)
PEDD	Plano Económico de Desenvolvimento Distrital (Economic District Strategic Development Plan)
PEDSA	Plano Estratégico de Desenvolvimento do Sector Agrário (Strategic Plan for Agricultural Sector Development)
PES	Payments for Environmental Services
PESOD	Plano Económico, Social e Orçamento Distrital (District Economic and Social Plan and Budget)
PSA	Pagamento por Serviços Ambientais (Payments for Environmental Services)
REDD+	Reducing Emissions from Deforestation and Forest Degradation
R-PIN	REDD Project Identification Note to the FCPF
R-PP	REDD Readiness Preparation Proposal to the FCPF
SADC	Southern African Development Community
TIA	Trabalho de Inquérito Agrícola (Agricultural Survey)
UEM	University Eduardo Mondlane
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change

Summary

This study offers an overview of the REDD+ (*Reducing Emissions from Deforestation and Forest Degradation in Developing Countries*) context in Mozambique through a synthesis of current knowledge about the causes of forest carbon changes, a review of the legal and institutional context and a description of the current political process of REDD+. The objective is to gather data and relevant information and offer a preliminary analysis of the fundamental aspects that can help promote REDD+ policy with effectiveness, efficiency and equity. This study finds the following:

1. Little is known about land-cover changes at the national level, and even less is known about more disaggregated levels and the influence of various production sectors. Some of the historical data presented in national statistics were not measured; they were estimated based on unreliable models that used population growth to create models of land-cover changes. To operationalise REDD+, a reliable baseline is needed to reasonably evaluate the effect of policies and interventions compared to historical trends. Consequently, it is important to prioritise the information survey and the processing of existing satellite images of forest cover in Mozambique – particularly in the main deforestation polygons surrounding big cities – along access roads and in regions of high population density. In the absence of reliable data, it will also be important to work with good hypotheses (informed by the literature and other country experiences) about the types and directions of the causes of deforestation and forest degradation.
2. Despite few references quantifying the specific causes of deforestation and forest degradation, various studies indicate that agriculture and fuel wood use constitute the two major causes. Agriculture is developed in small-scale both for subsistence (mainly maize) and for commercial purposes (sesame seed, tobacco and cotton) in family-based models with no external inputs. Charcoal, used particularly in urban areas, is commercialised mainly through the informal sector. This type of charcoal originates from unmanaged natural forests, which are not cultivated to sustain charcoal production, and is produced using methods and technologies such as traditional ovens (which are not very effective) as well as equipment such as stoves (which are not very efficient). In some cases, these causes of deforestation act together, insofar as agriculture needs energy (for example, to dry tobacco) and fuel wood and charcoal production promote the establishment of agricultural fields. Current agricultural and forestry policies have good intentions regarding the reduction of negative environmental impacts and the promotion of sustainable use of natural resources; nonetheless, the practice shows that its implementation is still weak.
3. Commercial logging is done selectively and known to be unsustainable. It is less directly associated with deforestation, but instead with forest degradation. Its indirect link with deforestation consists of promoting other activities, such as charcoal production and agriculture. Meanwhile, uncontrolled fires seem to be part of the dynamic of the dryforest ecosystem (typically the Miombo); although the impact of these fires is not well known, it may well be more than the ecosystem can handle. Other causes of deforestation and forest degradation, such as mining and infrastructure development, have an indirect impact and limited magnitude.
4. The underlying causes of deforestation and forest degradation include (i) technological factors (inefficient use of wood fuel, low agricultural land-use intensity); (ii) demographic factors (high demand from urban areas); (iii) economic factors, such as those related to export markets for agricultural commodities (sesame seed, tobacco and cotton) and timber; and (iv) institutional factors, especially the remarkably weak institutional capacity, particularly at the sub-national level (province and district) and the associated difficulties including poor enforcement of laws and regulations, as well as problems with

punishing offenders. These factors require attention in REDD+ policies, as they can be a challenge to overall REDD+ implementation. Our analysis indicates that policy and national practices (much more than international factors such as export markets), particularly the weak implementation capacity, as well as the interference of politicians from the national level in decision making at the local level, facilitate the continuous deforestation and forest degradation. Therefore, REDD+ policy implementation should consider the need to focus on the national governance system (especially on the accountability of the public organs) to implement its policies effectively.

5. The process of decentralisation in Mozambique is a fact. Nonetheless, given the history of a centralised economy and civil war, decentralisation is still incipient and requires the trust of actors at the local level. Decentralisation policies exist and include the establishment of district councils (with the power to plan district activities), collection of local taxes (despite their meaningless value), and availability of a part of the state budget for the implementation of district development plans (this share can represent up to 90% of the value used in the district but constitute only 1.5% of the overall state budget at the national level). It will also be important to strengthen the capacity of actors and local entities so they can execute public functions at the local level effectively.
6. Mozambique already has experience with benefit-sharing mechanisms. The most important process for REDD+ is to provide 20% of the revenue derived from the management of forest and fauna resources to local communities (at a lower level than the district); this was legislated in 2002 (through the Regulation of Forests and Wildlife) with the first payments made in 2005 (after the approval of the ministerial decree that regulates this availability mechanism). Despite the practical difficulties implementing the decree that regulates this process, it represents the most open experience of benefit sharing through the use of forest resources. There are also other local experiences of payments for environmental services, especially in Sofala and Cabo Delgado. These lessons and experiences

can be an important source of learning for REDD+.

7. The national development priorities are led by the development of the agriculture sector, production of biofuel, reforestation and mining. All these activities can have a great impact on land-use and land-cover patterns. The policies for these development sectors assume reduction of negative environmental impacts. The impact of applying these development strategies can constitute a great challenge for REDD+ insofar as a wrong interpretation of policies can lead to higher rates of deforestation. It will be important to have a detailed and elaborated land-management plan, based on participation, to facilitate an inter-sectoral plan.
8. The main actors of the REDD+ process in Mozambique include members of the government, academia, civil society and the private sector. They represent, in large part, those involved in the REDD+ Working Group, which was established in 2009 in response to the South-South Cooperation between the Ministry for Coordination of Environmental Affairs (MICOA) and the Amazonas Sustainable Foundation (FAS); they reflect the important participation of external actors (International Institute for Environment and Development; IIED, FAS and Indufor) in the national process. Until now, the Mozambique government – represented by various relevant institutions, especially MICOA, Ministry of Agriculture (MINAG) and the National Institute for Disaster Management (INGC) – has led national interventions about climate change. Nonetheless, with respect to REDD+, the participation of civil society, academia and the private sector was remarkable, especially in promoting debate and disseminating information, as well as developing consulting services and implementing pilot projects. It will be important for REDD+ to strengthen participation by other actors in its development process; to that end, more capacity building of those actors is needed.
9. In general, the process of developing the REDD+ National Strategy has been inclusive. Beginning April 2010, various meetings were held across the country in the scope of the

South-South Cooperation at the provincial, district and local levels, including with deputies in the Assembly of the Republic, permanent secretaries of ministries, the private sector, national and state institutions and the National Council of Sustainable Development. It will be important to build and strengthen this process in order to increase the participation of actors who are less involved, such as the private sector, national investigation agencies like the Institute of Agrarian Investigation of Mozambique, and public agencies not directly linked to forest management (agriculture and energy).

Regarding the potential impacts of REDD+, in terms of its effectiveness, cost-effectiveness, equity and co-benefits, this study reaches the following conclusions:

10. Effective results depend on the degree to which REDD+ policies are oriented towards mitigating the actual sources of forest carbon emission, and to the degree to which those policies respond to possible interactions between the causes of deforestation and forest degradation. In Mozambique, these causes (which tend to originate outside the forest sector) usually stem from the agriculture (shifting cultivation) and energy (fuel wood and charcoal production) sectors, as well as institutional deficiencies (power politics; weak enforcement of policies and legislation; and technical and human capacity constraints). Therefore, it is difficult to imagine an effective implementation of REDD+ without the alignment of REDD+ options with the development policies of these sectors (e.g., new and renewable energy policy, agricultural policy and strategy). Besides, allowing these policies to achieve REDD+ objectives will be critical to address the underlying causes of land-cover changes, especially institutional weakness and poor enforcement of laws and regulations.
11. Cost-effectiveness outcomes depend on (i) identifying and addressing the fundamental causes of forest carbon changes through viable REDD+ policy options, (ii) the government capacity to respond to REDD+ demands, especially at the sub-national level, but also on the capacity of civil society and other institutions to monitor government actions and the ability of the private sector to respond to REDD+ demands; and (iii) on the strength of the institutional framework. Currently, property rights in Mozambique are incomplete; in other words, exclusion and alienation rights over forest land are not regulated by law because the land belongs to the state.
12. The degree of equitable outcomes and the generation of co-benefits will depend largely on (i) whether the processes are inclusive and under national ownership, (ii) whether those who bear the costs of REDD+ are also being compensated, and (iii) the definition of rights over carbon and environmental services. The REDD+ process in Mozambique is being developed mainly in an inclusive manner, as demonstrated by the multipartner working group (at the centre of the national process over the last two years), through an important consultation process (with various stakeholders, including actors in the sub-national level), and with an already significant national ownership (with the participation of various actors from Mozambique in the REDD+ process). It will be crucial for Mozambique to continue this process.
13. Fair results also mean that those who bear the real costs should be appropriately compensated. Due to gaps in the property rights regime in Mozambique, the degree to which local communities can benefit from REDD+ depends on the definition of rights over carbon and other environmental services (for example, hydrological and biodiversity). A possibility would be to align these rights with the right to use and benefit from the forest (DUAF), in analogy to the DUAT (right to use and benefit from the land) regime already existing in Mozambique.

Resumo

Este estudo fornece uma visão geral do contexto de REDD+ em Moçambique através de uma síntese do conhecimento actual das principais causas da mudança de carbono florestal, uma revisão do quadro legal e institucional, e uma descrição do processo político actual de REDD+. O objectivo é reunir dados e informações pertinentes, e oferecer uma análise preliminar dos aspectos fundamentais a ter em conta para políticas de REDD+ eficazes, eficientes e equitativas. Este estudo apresenta as seguintes constatações:

1. Um problema sério inicial é que pouco se conhece sobre as mudanças de cobertura florestal ao nível nacional, e ainda menos sobre os níveis mais desagregados de regiões e da influência de vários sectores produtivos. Alguns dos dados históricos que figuram nas estatísticas nacionais não foram medidos, mas estimados mediante modelos que utilizavam o crescimento populacional como (provavelmente uma pouco confiável) base para modelar os câmbios de cobertura florestal. Para operacionalizar o REDD+, será necessária uma linha de base confiável para poder avaliar razoavelmente o efeito das políticas e intervenções, comparado com as tendências históricas. Consequentemente, devem receber prioridade o levantamento de informações e o processamento de imagens de satélite preexistentes sobre a cobertura florestal em Moçambique, particularmente nos principais focos de desmatamento, ao redor das grandes cidades, ao longo das vias de acesso e nas regiões de elevada densidade populacional. Na ausência de bons dados, também será importante para o desenho de políticas REDD+ estabelecer boas hipóteses (baseadas na literatura e experiências de outros países ou contextos comparáveis) sobre os tipos e as direcções das causas do desmatamento e da degradação florestal.
2. Apesar de poucas referências quantificando as causas específicas do desmatamento e da degradação florestal, vários estudos são unânimes ao mencionar que a agricultura e a energia lenhosa constituem as duas grandes causas. A agricultura é de pequena escala para subsistência (principalmente milho) e comercial (gergelim, tabaco, algodão), realizada em moldes familiares sem insumos externos. O carvão vegetal, utilizado particularmente nas zonas urbanas, é dominado pelo sector informal, sendo produzido a partir de florestas naturais sem nenhuma actividade de manejo, sem plantações florestais para sustentar a produção de carvão, com métodos e tecnologias de produção pouco eficientes (fornos tradicionais) e com consumo (fogões) de carvão pouco eficazes. Estas duas causas do desmatamento em alguns casos actuam em conjunto, na medida em que por um lado a agricultura precisa energia (por exemplo para secagem de tabaco) enquanto que a exploração de lenha e carvão abre caminhos de acesso para o estabelecimento de campos agrícolas. As actuais políticas de agricultura e de florestas têm boas intenções com relação à redução dos impactos ambientais negativos e promoção do uso sustentável dos recursos naturais, porém a prática mostra que a sua implementação ainda é fraca.
3. A exploração comercial de madeira, apesar de ser insustentável, dado o seu carácter selectivo, não parece levar ao desmatamento de maneira directa mas sim à degradação florestal, ao abrir caminho para outras actividades com impacto florestal tais como a produção de carvão e a agricultura. As queimadas descontroladas, por seu lado, parecem fazer parte da dinâmica do ecossistema, tipicamente de miombo, e apesar do seu impacto não ser devidamente conhecido, acredita-se que é mais concentrado na limitação do estoque máximo de carbono que o ecossistema pode armazenar. Outras causas do desmatamento e da degradação florestal tais como a mineração e construção de infraestrutura, entre outros, têm impactos indirectos e de magnitude limitada.
4. As causas basilares do desmatamento e da degradação florestal incluem: (i) factores tecnológicos (baixa eficiência de utilização de combustíveis lenhosos, baixa intensidade

- na utilização de terra para agricultura); (ii) factores demográficos (alta demanda das zonas urbanas); (iii) factores económicos, tais como aqueles relacionados com mercados de exportação de *commodities* agrícolas (gergelim, tabaco, algodão) e madeira; e (iv) factores institucionais, notavelmente a fraca capacidade institucional, particularmente ao nível subnacional (provincial e distrital) e as dificuldades associadas, tal como a aplicação deficiente das leis e regulamentos, bem como as dificuldades de perseguir os prevaricadores. Estes factores exigem um elevado nível de integração nas políticas do REDD+, o que pode constituir um desafio para a sua implementação. A análise realizada sugere que as políticas e práticas nacionais (muito mais que factores internacionais tais como mercados de exportação), particularmente a fraca capacidade de implementação, a interferência nas decisões ao nível local por políticos de nível nacional, entre outros, facilitam o contínuo desmatamento e a degradação de florestas. Sendo assim, a implementação das políticas de REDD+ devem tomar em consideração a necessidade de focar no reforço do sistema de governação nacional (sobretudo na responsabilização dos órgãos públicos) para realizar uma aplicação efectiva das políticas.
5. O processo de descentralização em Moçambique é um facto. Entretanto, com uma história de economia centralizada e guerra civil, a descentralização é ainda incipiente e para se tornar efectiva ainda requer a confiança dos actores que se encontram na base. As políticas de descentralização existem e incluem o estabelecimento de conselhos distritais (com o poder de planificar as actividades do distrito), recolher os impostos locais (apesar de incipientes e de valor irrisório), entrega de uma parte do orçamento do estado para a aplicação dos planos de desenvolvimento distrital (este valor pode representar até 90% do valor executado no distrito, mas constitui apenas 1.5% do orçamento geral do estado a nível nacional). Será importante fortalecer a capacidade dos actores e das entidades locais para eles poderem assumir a responsabilidade de executar efectivamente a função pública a nível local.
 6. Moçambique já tem experiências com mecanismos para a repartição de benefícios. O processo mais importante, de importância para REDD+, é a entrega de 20% das receitas geradas pela exploração de recursos florestais e faunísticos para as comunidades locais (a um nível inferior ao de distrito), que foi estabelecido por lei no ano de 2002 (através do Regulamento de Florestas e Fauna Bravia) com os primeiros pagamentos efectuados a partir de 2005 (com a aprovação do Decreto Ministerial que regula o mecanismo de entrega). Apesar das dificuldades práticas da implementação do decreto que regula este processo, isto representa a experiência mais aberta de repartição de benefícios pelo uso de recursos florestais. Também há outras experiências mais locais de pagamentos por serviços ambientais, principalmente em Sofala e Cabo Delgado. Estas experiências podem ser uma fonte importante de aprendizagem para REDD+.
 7. As prioridades nacionais de desenvolvimento são lideradas pelo desenvolvimento do sector da agricultura, produção de biocombustíveis, reforestamento e mineração. Todas estas actividades poderão ter um impacto muito grande no padrão de uso e cobertura de terra. Todas as políticas para estes sectores de desenvolvimento incluem premissas sobre a redução dos impactos ambientais negativos. O impacto da aplicação destas estratégias de desenvolvimento podem constituir um grande desafio para REDD+ na medida em que uma má interpretação das políticas pode levar ao aumento do desmatamento. Será importante ter um plano de gestão territorial detalhado e elaborado de forma participativa para facilitar uma melhor planificação inter-sectorial.
 8. Os principais actores do processo de REDD+ em Moçambique incluem membros do governo, da academia, da sociedade civil e do sector privado. Eles correspondem em grande medida aqueles envolvidos no Grupo de Trabalho de REDD+ estabelecido em 2009 em resposta à cooperação sul-sul entre o Ministério para a Coordenação da Acção Ambiental (MICOA) e a instituição brasileira Fundação Amazônia Sustentável (FAS), refletindo um importante envolvimento de actores exteriores (IIED, FAS, Indufor) no processo nacional.

Até o momento o Governo de Moçambique, representado por várias instituições relevantes, principalmente o MICOA, o MINAG (Ministério da Agricultura) e o INGC (Instituto Nacional de Gestão de Calamidades), tem liderado as intervenções nacionais sobre mudanças climáticas. No entanto, no âmbito de REDD+, a participação da sociedade civil, da academia e do sector privado passou a ser notável, especialmente na promoção de debates e disseminação de informações sobre REDD+, na realização de consultas e na implementação de projectospiloto. Será importante para REDD+ uma maior participação de outros actores no processo de REDD+ e, para este fim, um maior esforço na capacitação de tais actores.

9. Geralmente, o processo de preparação da estratégia nacional de REDD+ tem sido inclusiva. Desde abril de 2010 foram realizados vários encontros em todo o país no âmbito da cooperação Sul-Sul abrangendo diferentes níveis, desde deputados da Assembleia da República, Secretários Permanentes dos Ministérios, sector privado, instituições do governo e estado, o Conselho Nacional de Desenvolvimento Sustentado, e a nível provincial, distrital até a localidade. Será importante construir e reforçar este processo para aumentar a participação daqueles actores que ainda têm sido pouco activos tais como o sector privado, entidades de investigação nacional (por exemplo, o Instituto de Investigação Agrária de Moçambique - IIAM) e agências públicas não directamente ligadas ao manejo florestal (agricultura, energia).

Com respeito aos possíveis impactos de REDD+ em termos de efectividade, custo-eficácia e equidade e co-benefícios, este estudo revela as seguintes conclusões:

10. Os **resultados eficazes** dependem do grau em que as políticas de REDD+ sejam orientadas à mitigação real das fontes de mudança de carbono florestal, e na medida em que tais políticas respondem às possíveis interações entre as causas do desmatamento e da degradação florestal. Em Moçambique, estas tendem a se originar de fora do sector madeireiro, principalmente a partir de sectores da agricultura (agricultura itinerante) e de energia (lenha e produção de carvão vegetal), bem como de deficiências institucionais (poder político, a aplicação branda de políticas e leis, e restrições de capacidade técnica e humana). Assim, não é possível imaginar uma implementação efectiva de REDD+ sem o envolvimento daqueles sectores, particularmente o alinhamento das opções de REDD+ com as políticas de desenvolvimento daqueles sectores. Além disso, para permitir que essas políticas possam realmente alcançar os objectivos de REDD+, será fundamental, em paralelo investir na abordagem das causas subjacentes da mudança da cobertura florestal, principalmente nas fraquezas institucionais e na aplicação deficiente das leis e regulamentos.
11. O **custo-eficácia dos resultados** depende de (i) se as causas fundamentais da mudança de carbono florestal são identificadas e tratadas com opções políticas mais viáveis de REDD+; (ii) da capacidade do governo de responder às exigências de REDD+, sobretudo a nível subnacional, mas também da capacidade da sociedade civil e outras instituições para poder actuar como vigilantes das acções do governo e da capacidade do sector privado de responder às novas medidas de REDD+; e (iii) da força do quadro institucional. Actualmente, os direitos de propriedade em Moçambique são incompletos, ou seja, o direito de exclusão e alienação das terras florestais não é dada pela lei, pois todas as terras pertencem ao Estado.
12. O grau de sucesso dos **resultados equitativos** e a geração de **co-benefícios** dependerá em grande medida de (i) se os processos são inclusivos e realmente apropriados nacionalmente; (ii) se aqueles que suportam os custos de REDD+ também estão sendo compensados; e (iii) da definição sobre os direitos do carbono e dos serviços ambientais em geral. O processo de REDD+ em Moçambique está sendo construído de modo relativamente inclusivo, como demonstrado pelo grupo de trabalho multiparceiros (no centro do processo nacional nos últimos dois anos), por um importante nível de consultas (com diversas partes interessadas, incluindo os níveis subnacionais) e por uma já significativa apropriação nacional (com a participação de

vários actores moçambicanos no processo de REDD+). Será chave para Moçambique dar continuidade deste processo.

13. Resultados equitativos também implicam que aqueles que arcam com os custos reais sejam devidamente compensados. Finalmente, devido à lacuna nos direitos de propriedade em Moçambique, o grau em que as comunidades locais poderão se beneficiar de REDD+

dependerá da definição de direitos de carbono e outros serviços ambientais (p.e. hidrológicos, biodiversidade, etc.). Uma possibilidade seria alinhar estes direitos com os “direitos do uso e aproveitamento da floresta” ou “DUAF”, em analogia ao regime já existente em Moçambique chamado de “direito de uso e aproveitamento da terra (DUAT).

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Introduction

Mozambique is one of the few countries in Africa with a considerable proportion of its area still covered with natural forests. At the same time, it is one of the poorest countries in the world, with a high rate of deforestation and forest degradation. Thus, in response to global interests in financing efforts to reduce emissions from deforestation and forest degradation in developing countries (REDD+), Mozambique initiated a national REDD+ process in 2008.

This study aims to synthesise the data, information and knowledge about conditions that will affect the planning and implementation of REDD+ policies and measurements in Mozambique. The study was based on a review of existing literature, data from the national and international levels and a review of relevant legislation, following the instructions developed by the Global Comparative Study on REDD+ (Brockhaus *et al.* 2011). The country profile offers an overview of the context and conditions that affect REDD+ policies in each country, as well as a preliminary assessment of the effectiveness, efficiency and equity of the proposed

national strategies for REDD+. The profile is based on a review of existing documentation, particularly national data and legal documents, as well as interviews with specialists. In addition, the profile offers a collection of data and creates indicators that will promote further investigation of other components of the Global Comparative Study. Given the dynamic nature of the national and international context of REDD+ policies, this study only reflects the situation until January 2012.

This study is organised as follows: Chapter 1 describes the context of forests in Mozambique, including an analysis of statistics and the main factors that lead to deforestation and forest degradation. Chapter 2 analyses the institutional context, focusing on property rights. Chapter 3 describes the main national policies that shape the political economy of land use in Mozambique. Chapter 4 introduces the REDD+ process in Mozambique, including the main related political events. Chapter 5 concludes with a preliminary evaluation of options for effective, efficient, and equitable REDD+ outcomes in Mozambique.

1 Forests, land-use trends and drivers of deforestation and forest degradation

Rudel (2007) emphasises several reasons for deforestation and degradation – from direct causes (such as expansion of small-scale agricultural areas and poverty) to indirect causes (such as state policies and business interests inside and outside the forest sector). Powerful economic incentives seem to be behind the most relevant causes; often, they act in combination (Lambin *et al.* 2001). These incentives include economic booms in forest harvesting; agricultural colonisation and an increasing national and international demand for non-food agricultural products (e.g. biofuel); agricultural subsidies and other policies; infrastructure policies (e.g. construction of new roads); and, possibly, weak governance of land and forest. Today, the main driving forces of deforestation are seen outside the forest sector, and they interact in a complex way (Rudel 2007). This section provides an overview of current conditions of forest cover and past trends in forest-cover change, as well as an evaluation of the main driving forces of deforestation and forest degradation in Mozambique.

1.1 Current forest cover and historical changes

Mozambique is one of the few countries in southern Africa that still has a considerable area of natural forests (Figure 1). With an area of about 799,380 square km, the country is located at the east coast of southern Africa, bordering with Tanzania, Malawi, Zambia, Zimbabwe, Swaziland and South Africa. Estimates of the total forest cover vary, but a recent evaluation

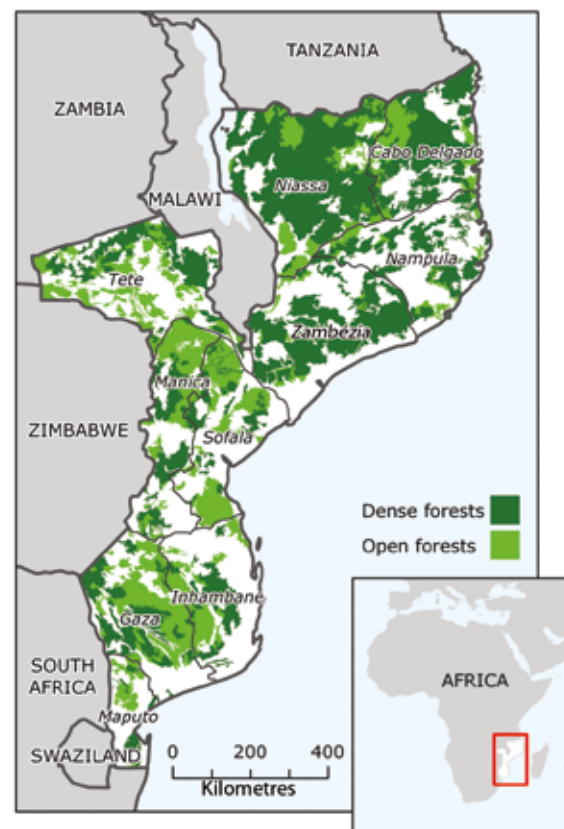


Figure 1. Mozambique's forest cover in 2007

Source: adapted from Marzoli (2007)

of forest resources indicates the country has 50% forest cover, a little more than 40 million ha (FAO 2010).

The most common reference on forest cover and forest-cover change in the country are based on the last National Forest Inventory (IFN – Inventário

Florestal Nacional) (Marzoli 2007). In 2005, the IFN updated the classification of land-cover and land-use categories and refined procedures for identifying types of land cover and use (Table 1). The IFN also adopted a definition of forest, based on that suggested by the FAO Forest Resources Assessment (FRA). The definition states: 'a forest is an area of at least 1 ha with a canopy cover equal or superior to 10%, with trees that reach more than 5 m' (FAO 2000). In addition, the IFN used the designation of 'other woody formations' that include thickets, shrub formations, wooded grasslands and areas combining shifting cultivation and forest. The last group is mainly constituted by secondary forests resulting from fallow agricultural areas.

Two types of maps for land cover and land use were elaborated: (1) at the national level, using a nominal scale of 1:1,000,000 with a resolution of 16 square km; and (2) at the provincial level (for

Maputo and Manica), using a nominal scale of 1:250,000, with a resolution of 1 square km. All told, 20 classes were identified at the national level, while 31 and 33 classes were identified in Manica and Maputo provinces, respectively.

The predominant ecosystem is the Miombo forest, which covers about two-thirds of the country north of the Rio Limpopo (Figure 2). Other ecosystems include mopane in the semi-arid regions of the hinterlands (in the valleys of Limpopo and Zambeze) and the undifferentiated forests on the coast of the central region.

In addition to mapping land use and land cover, the IFN also mapped forests according to their availability and potential to produce for the timber industry: production forests, conservation forests and protection forests (Table 2). Production forests cover the greatest area of forests (67%) in Mozambique. About one-fifth of forests are

Table 1. Simplified classification of the types of forest cover (2005)

Type of vegetation		Area ['000 ha]	Percentage
1. Forests (Forest cover > 10%, height > 5 metres)		40,068	51.4
Natural or semi-natural	Dense forests (Canopy cover > 40%)	22,519	28.9
	Open forests (Canopy cover 10-40%)	16,390	21.0
	Mangroves	357	0.5
	Open rainforests	802	1.0
Forest plantations		n.a.	n.a.
2. Other woody formations (Forest cover < 10%, height < 5 metres)		14,712	18.9
Thickets		1,093	1.4
Shrubbery		8,051	10.3
Forest areas with shifting cultivation		5,568	7.1
3. Other lands (Mainly non-forest uses)		23,211	29.8
Grassland		9,359	12.0
Agriculture		11,369	14.6
Areas without vegetation		1,580	2.0
Water		903	1.2
Total		77,991	100.0

Source: Marzoli (2007)

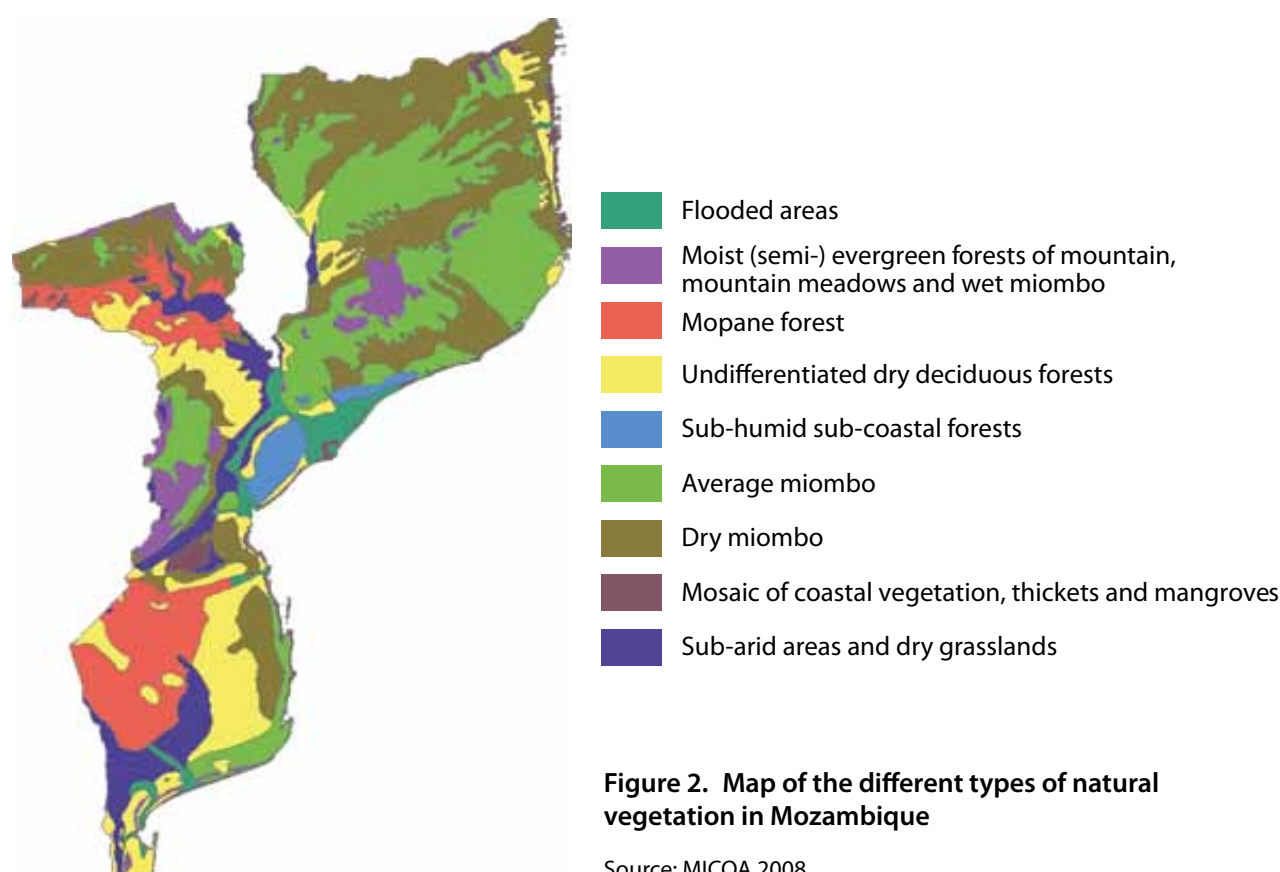


Table 2. Classification of forest types based on their use

Type of forest	Definition	Extent	Predominant location
Production forests ^a	Vegetation formations of high timber volume (> 32 cubic metres/ha), located outside the protection and conservation zones.	26.9 million ha (67.2% of the total forest area)	Niassa (6.0 million ha), Zambézia (4.1 million ha), Tete (3.3 million ha) and Cabo Delgado (3.2 million ha)
Conservation forests ^b	Non-working forests located, by legal limitation, in conservation areas determined through legal instruments.	8.9 million ha (22.2% of the total area of the country)	Located throughout the country, representing different ecosystems; large areas in Niassa (3.1 million ha), Sofala (1.5 million ha), Cabo Delgado (1.4 million ha) and Gaza (1.01 million ha)
Protection forests ^c	No legal definition.	About 4.2 million ha (10.6% of the national forest cover)	Dispersed throughout the country; most evident are mangroves and forests in hilly areas; large areas in Inhambane (0.91 million ha), Tete (0.88 million ha), Zambézia (0.67 million ha) and Sofala (0.40 million ha)

Notes:

a About 13.2 million ha of production forest are not favourable for timber production, most of which (9 million ha) is located within the national parks, forest reserves and other conservation areas.

b Conservation forests are within national parks, game reserves, forest reserves, integral reserves and *coutadas*, including those areas of historical and cultural use and value.

c Marzoli (2007) defined protection forests as those forests in areas temporarily or permanently inundated (flooded areas, including mangroves) and those located in rough or moderately uneven terrain. These forests have a role in protecting the soil (areas with steep slopes and mountain areas) and water (river banks and mangroves).

Source: Mozambique FAO FRA 2010

in conservation areas, while a small proportion (10%) are protection forests. This is a simplified classification considering the needs for timber production for commercial purposes. Nonetheless, it offers basic information about the localisation of forests and their potential to store carbon and offer protection.

1.1.1 Deforestation

Deforestation and forest degradation are common in Mozambique. Table 3 provides a general overview over the main sources of data on forest cover change.

One important observation is that deforestation has increased since 1992. This increase reflects the effects of 'passive conservation' during the war (1976–1992) where access to rural areas was difficult and massive migration to neighbouring countries occurred. However, after the end of the war in 1992, agricultural fields reopened.

No studies were found on forest-cover changes by vegetation type. One of the main reasons for this is that the different national forest inventories (Saket 1994, Marzoli 2007) use their own classifications, which makes direct comparisons difficult. Mangroves, given their characteristics and location, are the only type of vegetation clearly distinguishable on satellite images. Marzoli (2007) estimated that the total area of mangroves in Mozambique was reduced from 408,000 ha in 1972 to 357,000 ha in 2004, a loss of 51,000 ha within 32 years. Additionally, the rate of loss in the area increased from 67 ha per year (-0.2% per year)

from 1972 to 1990 to 217 ha per year (-0.7% per year) from 1990 to 2004. It is important to note that the use of resources from mangroves is not the only cause of loss in Mozambique: the effects of floods in 2000 also contributed to a loss of more than half of the mangrove area in the mouth of the Limpopo River.

Between 1990–2002, according to Marzoli (2007), 219,000 ha of forest were lost at the national level, with varying intensity across provinces. The highest rates were observed in the centre of the country (in the Province of Zambézia) and Nampula in the north (Table 4). Based on the results of the deforestation model (Box 1), Marzoli (2007) suspects that deforestation is concentrated in the provinces of the centre and north of Mozambique, where population density is higher. Although Maputo province reports a small absolute rate of forest cover change, its relative forest cover change rate is higher due to the small size of the denominator, the province.

The results of the inventory of Manica province (Marzoli 2007), which compared maps based on satellite images, indicate that 433,132 ha (348,000 ha of dense forests and 85,132 ha of open forests) were deforested from 1990 to 2002. This was the equivalent of a deforestation rate of nearly 31 ha (-0.81%) per year. The major part of the deforested area was converted to agricultural lands: the greatest change for dense forest occurred in the categories of forest with shifting cultivation (67%), shifting cultivation with forests (19%) and agricultural crops, especially tobacco (7.5%).

Box 1. Calculation of deforestation rate

The rate of deforestation in Mozambique was estimated based on surveys of national forest inventories. In his inventory, Saket (1994) used a forest classification (based on canopy cover from 25%) that was not used in Marzoli's inventory (2007), which used as baseline a cover of 10%. The first inventory used satellite images and aerial photographs to estimate the deforestation rate; it had limited access to the field due to the war that ravaged many regions. The second inventory only compared satellite images of the provinces of Manica and Maputo; however, it did not compare satellite images for Maputo province in great detail. So the annual deforestation rate of 0.58% for 1992–2002, which is currently widely used, is based on a model that combined population density (inhabitants/square kilometre) and the percentage of forest cover. FAO developed the model, adjusting it for conditions in Mozambique, where it was applied at the provincial level. Indeed, official deforestation statistics in Mozambique were developed based on the FAO model rather than on systematic observations of satellite images.

Table 3. Estimates of forest cover and deforestation in Mozambique

Author	Forest cover [ha]	Year	Annual deforestation [ha]	Reduction rate [%]	Period	Type of information source	Comments about forest cover
FAO (2010)	43,378,000	1990	-219,000	-0.52	1990–00	Jansen <i>et al.</i> (2008). Interpretation of satellite images of land use and cover in the provinces of Manica and Maputo in the nominal scale of 1:250,000 and in the national scale of 1:1,000,000. Marzoli 2007	Total forest, canopy cover > 10%
FRA	41,188,000	2000	-222,000	-0.54	2000–05		
	40,079,000	2005	-211,000	-0.53	2005–10		
	39,022,000	2010					
http://rainforests.mongabay.com/deforestation/archive/Mozambique.htm	20,012,000	1990	-50,000		1990–00	National Forest Inventory supplemented by satellite images and opinion of experts. Modis Satellite (resolution 500 m)	Total forests, > 30% canopy cover
FRA	19,512,000	2000	-50,000		2000–05		
	19,262,000	2005					
FAO (2001)	30,601,000	2000				National Forest Inventory supplemented by satellite images and opinion of experts. Modis Satellite (resolution 500 m)	Forests, canopy cover > 10% and < 50%
FRA							
WRI (2005)	74,488,550 (canopy cover > 10%)	2000	-	-	-		
	15,681,800 (canopy cover > 50%)						
Marzoli (2007)	40,600,000 (canopy cover > 10% and tree height > 5m)	2002	-219,000	-0.58	1990–02	Population density-based model combined with data of national forest inventory (scale 1:1,000,000) and visual interpretation of Landsat TM satellite images for two provinces, Manica and Maputo (scale 1:250,000)	
Saket (1994)	19,700,000 (canopy cover > 25% de)	1990		-0.24	1972–90	Interpretation of satellite images and aerial photograph scale: 1:250,000)	Mapping of forest vegetation
Forests, grasslands and drylands of Mozambique	30,551,000	2000	-	-0.20	1990–00	Canopy cover data obtained through different methods (non-specified) than those used for areas of forest. The two estimates can differ significantly.	Canopy cover > 10%, minimum area 0.5 ha, and tree height > 5m
Marzoli (2007)							

Sources: Noted above and WRI (2010)

Table 4. Estimates of deforestation rate by province, 1990–2002

Province	Forest areas and other woody vegetation estimated for 1990 ('000 ha)	Forest areas and other woody vegetation estimated for 2002 ('000 ha)	Annual change of forest area and woody vegetation ('000 ha)	Annual change of forest area ('000 ha)	Annual rate of deforestation, 1990–2002 (%)
Maputo	1,280	1,078	17	16	1.67
Nampula	3,958	3,509	37	33	1.18
Manica	4,340	4,005	28	23	0.75
Zambézia	5,819	5,356	39	31	0.71
Tete	7,376	7,025	29	27	0.64
Sofala	4,430	4,161	22	20	0.63
Cabo Delgado	5,322	4,989	28	25	0.54
Inhambane	4,585	4,424	13	11	0.52
Gaza	5,182	5,027	13	13	0.33
Niassa	9,635	9,379	21	21	0.22
Total	51,926	48,952	248	219	0.58

Source: Marzoli (2007)

Although the forest inventory indicates that the detailed map was produced for the provinces of Manica and Maputo, details about Maputo province were not presented.

Generally, deforestation in the tropics is described as being high near the cities and along the access routes (Chomitz *et al.* 2006). A similar situation was found in Mozambique, where the most important polygons of deforestation are near large cities such as Maputo (Pereira *et al.* 2001), areas of rapid economic development such as the Beira Corridor in Manica and Sofala (Argola 2004), and main arteries such National Road 102 (Estrada Nacional 102) in Manica (Jansen *et al.* 2008).

An analysis of temporal and spatial patterns of deforestation in Mozambique suggests much variability and many confusing factors. Some factors that interact to determine the deforestation rate in Mozambique include the movement of refugees during the war and their return, as well as population growth, proximity to urban centres, accessibility and localisation of preferable areas for agricultural development. The national inventories used different methodologies of analysis, and the population-based model to estimate the deforestation rate seems too simplistic to explain the complexity of the process. Regional studies

of the dynamic of forest cover that include Mozambique were not found, while studies at the sub-national level are few and limited in their spatial and temporal coverage. Therefore, references about deforestation in Mozambique indicate that the national forest inventories are the primary source of information. A coherent analysis that seeks to explore the most important causes of deforestation is needed, with emphasis on more dynamic areas in order to offer more reliable information about deforestation and its trends.

1.1.2 Forest degradation

The application of the concept of forest degradation to the conditions in Mozambique is not yet clear. There is a perception that this concept can be defined as the 'change of a forest area with high coverage to another forest category with less coverage'. Processes of degradation can be the result of selective tree felling (e.g. logging), uncontrolled fires or opening of small *machambas* (agricultural fields) in the forest that resulting in agriculture-forest mosaics. Although studies of forest degradation are few and have been conducted in relatively small areas (Manica province and the Beira Corridor), they suggest that forest degradation is high (Table 5). Still, not all forms of forest degradation can be measured with

Table 5. Estimates of forest degradation in some regions in Mozambique

Author	Rate of degradation	Activity studied	Study location	Methodology	Comments
Argola (2004)	1.4% per year (1991–1999)	Land-use and forest-cover change	Districts of the Beira Corridor (Dondo, Nhamatanda, Gondola, Manica)	Interpretation of satellite images and field observations	The Beira Corridor is one of the areas with the greatest rate of change. The period studied is specifically the end of the civil war
Jansen <i>et al.</i> (2006)	0.81% per year 1990–2004	Land-use and forest-cover change	Manica province	Interpretation of satellite images and field observations	For the most part, the conversion consisted of dense and open forests to agriculture–forest and forest–agriculture mosaics
Ryan <i>et al.</i> (2011)	67% (0.15 TgC in three years) of loss was caused by forest degradation.	Deforestation and forest degradation	1,160 square km in the Gorongosa and Nhamatanda districts	Interpretation of ALOS PALSAR satellite imagery	The method presented has the potential to monitor forest-cover change and forest degradation

precision. Therefore, Ryan *et al.* (2011) indicate that the high rate of deforestation estimated in the districts of Gorongosa and Nhamatanda may be wrong.

Unsustainable logging (see Section 1.2.3 below) is one of the causes of forest degradation, especially since loggers tend to open access to the forest for others to follow. Fuel wood collection and charcoal production constitute another cause that is common in southern Africa and especially in Mozambique. Various studies indicate the strong relationship between wood fuels production and deforestation and forest degradation (Pereira *et al.* 2001, Argola 2004, Marzoli 2007). In addition to areas directly converted to agriculture, extensive areas of dense forests are converted to less dense forests or thickets. The latter is due to the selective cutting of trees for wood fuel production causing degradation. As the distance to the felling area increases, a second, less-selective round of cutting removes the majority of the remaining trees – thus causing deforestation. Most charcoal production and firewood sales take place in areas surrounding the cities and along the major roads. This confirms that urban consumption of fuel wood causes great impact on the forest ecosystem.

Finally, reports on unsustainable management and illegal logging in the central and northern

provinces indicate additional forest degradation (World Bank/WWF Alliance 2002, Mackenzie 2006, Ribeiro e Nhabanga 2009). Estimates of the volume of illegal logging or unsustainable management are scarce, but Ribeiro (2011) suggests that about 50–70% of the total volume of timber logged in Mozambique being illegal. This is very high compared to the 40% estimated by Contreras-Hermosilla *et al.* (2007) for all tropical forests. In addition, Pereira (2001) estimated that only 10% of the firewood and charcoal that enters the cities of Maputo and Matola is supplied by licenced producers. This reveals important revenue losses in the forestry sector.

In sum, these observations and studies indicate that forest degradation originates from within the forestry sector (e.g. logging, firewood and charcoal production), as well as from other sectors (e.g. shifting cultivation). In combination, these processes can culminate in deforestation.

1.2 Review of the main drivers of forest-cover change in Mozambique

Changes in land use and forest cover in the last 20 years cannot be separated from the main historical events of the past 30 years, including the national liberation struggle and civil war soon after independence. During the civil war (1976

to 1992), access to rural areas was difficult. This resulted in a low rate of deforestation, affecting only a few areas that were relatively safe from conflict. After 1992, rural areas – motivated by new development policies – received greater attention in the areas of agricultural development, forest management, infrastructure development and mining. This process may have resulted in a particularly high rate of deforestation and forest degradation in the period of 1990–2000, as reported in the national forest inventory. This section will focus on the main drivers of land-use and forest-cover change in Mozambique.

1.2.1 Firewood and charcoal production

The consumption of wood fuels (firewood and charcoal) was estimated at about 9.3 and 5.5 million tons/year in the rural and urban areas, respectively, reaching 14.8 million tons at the national level (Siteo *et al.* 2007). These estimates are equivalent to a per capita consumption of 1–1.2 cubic metres per year. This figure is higher than the volume of annual allowable cut for commercial timber, raising concerns about the sustainability of wood fuel production.

The production of charcoal is associated with a greater environmental impact than firewood production, especially in peri-urban areas (FAO 2010), and it is considered one of the main causes of deforestation in Africa (Cuvilas *et al.* 2010). This happens because charcoal is usually produced from a tree's main stems or large branches, and requires tree cutting (Girard 2002). The charcoal industry that supplies urban centres operates over large areas, and relocates when the production areas have been depleted (Pereira *et al.* 2001).

The causes of high demand for firewood and charcoal are associated with various factors, including low purchasing power and lack of feasible alternative energy sources in urban areas. In addition, despite efforts to provide electrification and natural gas for cooking, few family groups have adopted alternative forms of energy. Although those families use electricity for lighting, they continue to use firewood or charcoal for cooking. For example, a study of the costs of different sources of energy, conducted in the city of Beira (Egas 2006), revealed that charcoal was the most expensive source (compared to electricity and

gas) per energy unit. It seems the initial purchase of a stove is the main obstacle for the transition to this source of energy.

The connection between firewood harvesting and charcoal production and deforestation or forest degradation has been extensively studied in Mozambique. Most studies (e.g. Pereira *et al.* 2001, Cuambe 2008) reveal significant pressure on forest resources surrounding large cities (Maputo, Matola, Beira and Nampula) and provinces, particularly Gaza and Inhambane, where the search for fuel wood is intense (Table 6). This fact is also represented in a map by Cuambe (2008) that depicts the risk of deforestation in response to the search for wood fuels for Maputo and Matola (Figure 3). Box 2 presents additional details for the different schemes of rural and urban exploration and consumption of wood fuels.

The production of firewood and charcoal are informal activities that are profitable near large urban centres (such as Maputo, Beira and

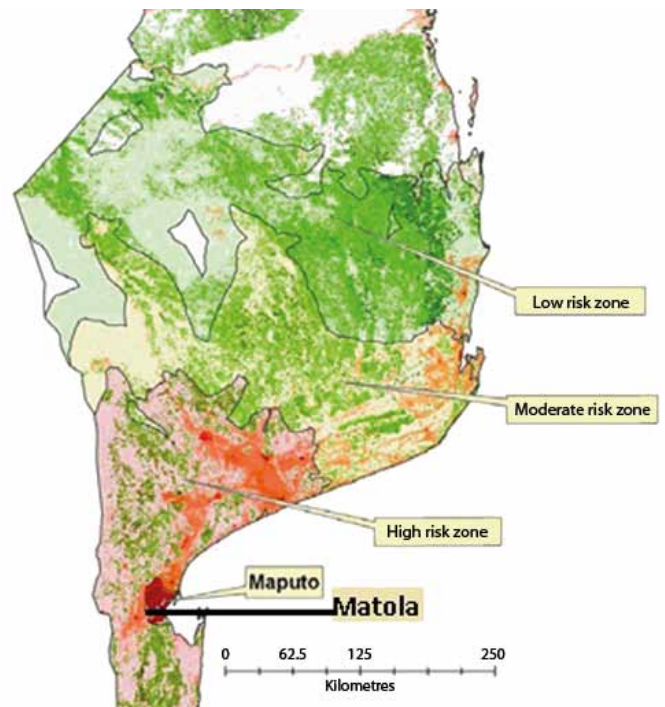


Figure 3. Risk zones for deforestation and forest degradation for the sustainable supply of firewood and charcoal to the cities of Maputo and Matola

Source: Cuambe (2008)

Box 2. Production and consumption of fuel wood in urban zones versus rural zones

There are differences in the acquisition and consumption of fuel wood in urban and rural zones (Sitoe *et al.* 2007): in rural areas, firewood is the dominant source of energy, obtained mainly as dry branches and dead trees or from clearing to establish small agricultural fields (machambas). The intensity of the exploitation of firewood for use in rural areas is low due to the low population density, typical of small populations with scattered dwellings. Even small local factories that produce alcoholic beverages and fire bricks, which add to the consumption of firewood, do not seem to exert a high pressure on forests. Charcoal is the dominant form of fuel wood in urban zones at the domestic level, while industries and large kitchens (e.g. at hospitals and boarding schools) use firewood. Firewood and charcoal production for urban consumption is intensive. Trees are cut to produce firewood or charcoal. The system of tree felling for firewood and charcoal production is not very selective, and almost all small- to medium-sized trees are cut. Small trees (diameter at breast height < 20 cm) are preferable due to easy felling and handling, resulting in clear cutting. The process of charcoal production (for urban areas) is typically manual and so, to avoid hauling tree trunks over long distances, operators prefer to set up ovens near felled trees.

Table 6. Major studies on the production and consumption of fuel wood in Mozambique

Authors	Study area	Methodology	Consumption of fuel wood	Relation to deforestation
Cuambe (2008)	National	FAO; called WISDOM (Wood fuel Integrated Supply/ Demand Overview Mapping)	Positive balance of woody biomass at the national level, but not at the provincial level, especially in the city and province of Maputo	Pressure in the forest areas of the provinces adjacent to Maputo and Matola (e.g. Gaza and Inhambane)
Perreira <i>et al.</i> (2001)	Maputo province, emphasis on the Matutuine district	Survey of domestic and industrial consumption, licensing of firewood and charcoal, and mapping using satellite images of areas with potential for woody biomass production		Average rate of deforestation in the districts of Moamba Namaacha, Magude Matutuine at 5.7% per year. Other causes of deforestation in those districts include conversion to agriculture
Sitoe <i>et al.</i> (2007)	National, with sampling units in the provinces of Maputo, Gaza, Sofala, Zambézia, Tete and Nampula	Survey of domestic and industrial consumption of firewood and charcoal. Estimates of biomass production based on data from national forest inventory	1.0 to 1.2 tons/capita/year estimated as the average consumption of fuel wood (firewood and charcoal)	The high demand for firewood and charcoal around the towns exceeds the sustainable local production of natural forests, resulting in pressure that leads to deforestation. Rural firewood consumption does not cause deforestation
Sitoe <i>et al.</i> (2007)	North of Sofala	Simulation model comparing production versus consumption of firewood and charcoal	The northern region of Sofala produces a lot of biomass, but its spatial distribution is different, resulting in high pressure in areas of high population density	Deforestation and forest degradation polygons were anticipated for the Dondo-Savane region and the Gorongosa district

Nampula) and along the main access routes leading to those cities. A study of small- and medium-size forestry companies indicates that 99% of about 151,000 charcoal enterprises and 96% of about 9,350 firewood enterprises are not registered and operate without a licence (Anonymous. 2011).

Underlying causes include demographic factors (high demand in urban zones) and technological factors (for firewood production, high cost and a limited system of distribution of other sources of energy, e.g. gas and electricity; for charcoal production, low productivity of charcoal and ovens, high cost and a limited system of distribution of other sources of energy, e.g. gas and electricity).

Despite the efforts of the Department of Forests and Wildlife to control firewood and charcoal producers, it is limited to monitoring transport and transit activity. Thus it is unaware of how these products are obtained and from where.

In addition to pressures from demand for firewood and charcoal, the opening of areas for the opening of areas for small agricultural fields (machambas) and villages also promotes forest degradation and eventually deforestation. It appears, then, that agriculture and the demand for fuel wood act together to promote forest-cover change.

1.2.2 Commercial and subsistence agriculture

Agriculture is seen as one of the main causes of deforestation in Mozambique (Saket 1994, Jansen *et al.* 2006, Marzoli 2007, FCPF R-PIN 2008). The direct impact of deforestation results from the direct conversion of forests to areas of permanent agricultural or shifting cultivation. The indirect impact on the forest includes a transition phase during which hardwood is extracted, followed by the extraction of firewood and charcoal (a process made simpler since the forest has become accessible for logging). These areas are later used for agriculture, which suggests once more that agriculture and fuel-wood production work in combination to create forest-cover change (see Figure 4).

A complete database on agriculture in Mozambique is not available, although the 2009/10 Agricultural Census offers some details

on the current situation. Annual surveys of the family sector (National Agricultural Survey – TIA) have been conducted since 2002, but these exclude producers from the industrial sectors. Nonetheless, unpublished data about the industrial sector in the TIA do exist. There are plans for Italian Cooperation to survey farmers in the industrial sector. The Agricultural Census, which is less exhaustive in terms of the observed variables than the 2000/01 TIA (INE 2002), was updated in 2009/10 (INE 2011).

Food production

Food production is practised mainly by the family sector. The 2009/10 Agricultural Census (INE 2011) reveals that of an inventory of 3.8 million units of agricultural production, 99% are small (1.4 ha on average) occupying 96% of the total food crop area. The production techniques are rudimentary; the work is manual and without inputs, which suggests a very low productivity level. Of the more than 3.8 million small holders, only 5.3% apply irrigation, 3.7% apply fertilisers and 2.5% apply pesticides. Many of these areas are subjected to shifting cultivation, usually forming mosaics of cropland and fallow areas in different phases of development. Data on the duration of fallow and its variation in recent years were not found. The crop system is usually intercropping or mixture, including cereals (corn, sorghum, millet), tubers (cassava, sweet potatoes, yams), legumes (peanuts, beans) and vegetables. The area under cultivation for food production doubled from 2001 to 2007. In general, FAOSTAT (2010) attributes increased agricultural production (e.g. cereal production increased from 792,000 tons in 1994 to 1,785,000 tons in 2009) mainly to the expansion of cultivated areas (areas of cereal cultivation increased from 3.57 million ha in 1994 to 5.05 million ha in 2009). Most of the production volume of these crops is consumed within the household; surpluses can be sold.

Between 2000 and 2010, the cultivated area for staple food crops increased by about 1.9 million m (59% of the initial area) (Table 7). Part of this area may have resulted from the reopening of the machambas with the return of the refugees after the war, but perhaps new areas have been cleared.

The underlying causes of the agricultural expansion include among others, limited access to higher

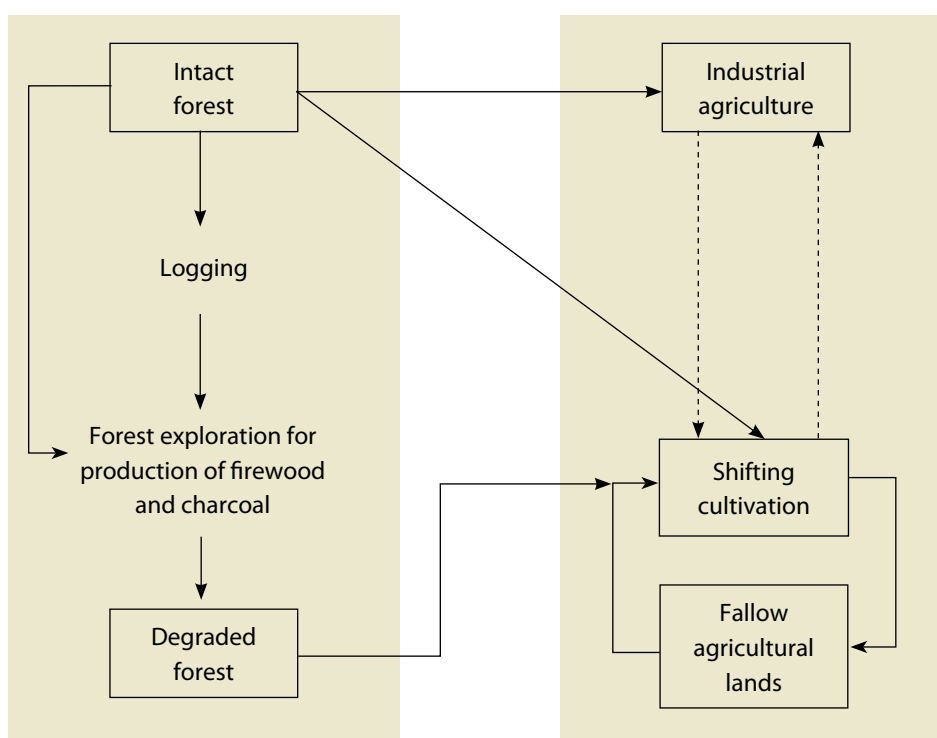


Figure 4. Dynamics of land-use and forest-cover changes, Beira Corridor

Source: adapted from Sitoe *et al.* (2004)

Table 7. Area of staple food crops in 2001–2010

Provinces	2000–2001 [ha]	2009–2010 [ha]	Difference [ha]	Difference [%]
Maputo	60,168	147,813	87,645	145.7
Gaza	357,918	343,027	-14,891	-4.2
Inhambane	344,834	402,380	57,546	16.7
Manica	255,424	473,956	218,532	85.6
Sofala	226,678	480,532	253,854	112.0
Tete	308,814	516,426	207,612	67.2
Zambézia	506,627	1,114,369	607,742	120.0
Nampula	624,748	874,480	249,732	40.0
Niassa	203,079	375,659	172,580	85.0
Cabo Delgado	323,161	386,640	63,479	19.6
Total	3,211,451	5,115,282	1,903,831	59.3

Source: INE (2002), INE (2011)

productivity technologies. The agricultural census of 2009/10 (INE 2011) indicates that 40% of all agricultural initiatives use at least one type of mechanisation and transportation. However, this number includes a large volume of

bicycles: excluding bicycles, only 8% of farms use mechanisation. Moreover, only a small percentage uses fertilisers or water. All this indicates a very low productivity, which requires the expansion of agricultural areas to increase production.

Cash crops

Commercial agriculture in Mozambique is still very new (Box 3). Of 36 million ha of arable land, only 1.5 million are devoted to cash crops, including nuts and coconut (INE 2011). Cash crops are mainly produced by small-scale family farmers. According to the agricultural census of 2009/10 (INE 2011), of the nearly 800,000 cash-crop farms, 99% are small producers that occupy an area of just over 243,000 ha (76% of the area of cash crops). The main cash crops in Mozambique, include cashew, sesame, tobacco, cotton and sugarcane, among others (Figure 5b).

Sugarcane ranks first in terms of volume (with a total production of about 2.2 million tons in 2009/10); cotton, cashew nuts and tobacco, cultivated mainly in the family sector, produced 65,000, 64,000 and 63,000 tons, respectively, in 2009/10 (MINAG 2010).

Another underlying cause of agricultural expansion is the high international demand for agricultural

products such as sesame seed, tobacco and cotton. The country has always produced cotton, with Nampula, Cabo Delgado and Tete together accounting for 75% of the cultivated area of this crop. Tobacco remained dominant in the provinces of Tete and Niassa, which represent 89% of the area cultivated with this crop nationwide (see Box 4). Over the last 10 years, sesame seed has appeared as an important crop in Mozambique, especially in the provinces of Nampula, Sofala and Cabo Delgado, which together account for 70% of the total cultivated area (Table 8). In 2006, Hanlon and Smart (2008) indicated, exports of tobacco and cotton amounted to, respectively, US \$109 million (5% of exports) and US \$42 million (2% of exports).

Generally, sugar is grown in non-forested areas, especially in areas with a high water table and abundant water supply, usually on alluvial soils in the valleys of major rivers (e.g. Zambeze, Púngue-Buzi and Incomati). Given their locations, it can be inferred that sugar cultivation does not

Box 3. Historical antecedents of agriculture in Mozambique

In the late 1970s, after Mozambique's independence, agricultural policies were dominated by the Central State Plan, which called for production in large scale through state-owned enterprises. Strategic regions for agricultural production where large projects were established, such as Complexo Agro-industrial do Limpopo, Complexo Agro-industrial de Angónia, o regadio do Inguri and projecto dos 400 mil hectares were defined. Many of these areas were chosen based on their agroecological potential and were crucial for the agricultural development of the time. The main crops in these areas were cereals and vegetables, which were directed towards domestic self-sufficiency. Farmers in the family sector, on the other hand, were organised in cooperatives and collective *machambas* (*people's machambas*) to form the nucleus of agriculture intensification. This included, for example, the consumer's cooperative of Chinhamacungo, in Manica, which constituted a model of agricultural development for small farmers. These were models of socialist production applied to the conditions in Mozambique. Mosca (2011) reveals that this mode of production had strong funding as a strategy of development, although it was not efficient. When the war started, all infrastructure was destroyed and the staff that worked in these projects was dispersed.

After the war (in 1992), centralised planning ended and agricultural policies were reoriented towards a market economy. The state-owned enterprises failed, and having no staff and insufficient capital, were closed and abandoned. In some cases, they were sold to the private sector. The state no longer directly financed agriculture and started to play the role of regulator and supervisor. Farmers who had joined cooperatives returned to their family *machambas* (those that were set aside during the war) to produce for subsistence and some cash crops for large private companies with emphasis on cotton, tobacco and, very recently, sesame. The cotton and tobacco companies are restricted mainly to processing, with production being carried out mainly by small family farmers in the sector who benefit by receiving certain inputs and technical assistance from the respective companies (Hanlon and Smart 2008). The sugar companies are now the largest agricultural companies, in terms of both production and processing.

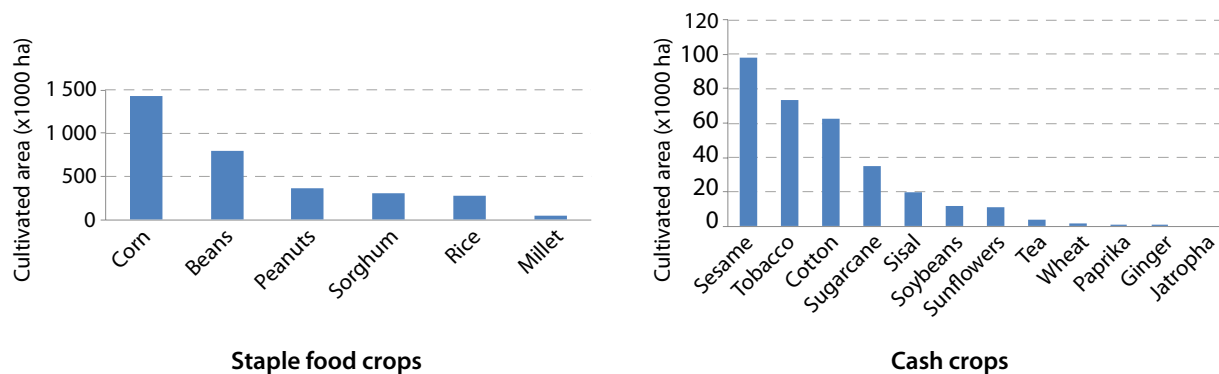


Figure 5. Cultivated area of staple food crops and cash crops in 2009/10

Source: INE (2011)

Box 4. The cultivation of tobacco in Mozambique

The cultivation of tobacco in Mozambique is practiced mainly in the provinces of Tete (42,920 ha) and Niassa (22,542 ha), which together represent 89% of the area cultivated with this crop at the national level. The province of Manica, a major producer of tobacco in the 1990s and early 2000s, now produces only about 2,000 ha. The main system of cultivation is through encouraging small farmers, especially of the family sector. In 2009/10, 70,000 ha – representing 96% of the 73,000 ha cultivated with tobacco – were operated by small farmers (110,000, from a total of 111,000 producers) with areas less than 3 ha. Tobacco companies, such as Mozambique Leaf Tobacco and British American Tobacco, deliver inputs (seed and fertiliser) and provide technical assistance through extension services to small farmers, who are committed to sell the product to the company that provided the assistance. As a measure of facilitation, the companies split up their area of influence by regions. In 2009/10, 63,000 tons of tobacco were produced. In 2003, the export of tobacco yielded US \$11 million, rising dramatically to US\$ 109 million in 2006 (Hanlon and Smart 2008 : 119). The main type of tobacco produced (over 90%) is *burley*, which is dried in air and can be cured without firewood (Mundy *et al.* 2010). Note, however, that in 2011, the MLT began replacing the burley variety from Virginia with one requiring drying with firewood, and which may thus in coming years promote deforestation. The company produces seedlings that are delivered to farmers for their crop.

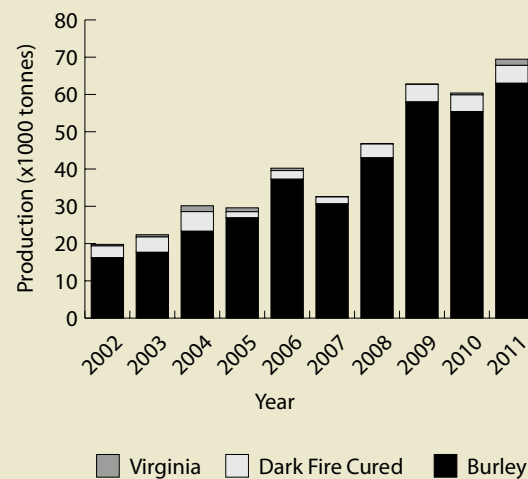


Figure B1. Types of tobacco produced by Mozambique Leaf Tobacco (MLT) and its evolution from 2002 to 2011 – Production of MLT by variety. Source: Jornal Magazine Independente (Sulemento), 31 August 2011.

contribute significantly to changes in forest cover – at least not directly.

Perennial crops (mainly copra, cashews and tea) were established mainly in the 1960s and 1970s,

and their areas have not changed significantly in recent years. Given their perennial nature, these crops do not require the opening of new fields each year; thus, they contribute very little to changes in forest cover. Moreover, copra and cashews

Table 8. Areas of production of the three main cash crops in 2000–2010

Province	Tobacco				Cotton				Sesame seed*			
	2000/01		2009/10		2000/01		2009/10		2000/01		2009/10	
	[ha]	[%]	[ha]	[%]	[ha]	[%]	[ha]	[%]	[ha]	[%]	[ha]	[%]
Maputo	20	0.1	1	0.0	7	0.0	-	-	-	-	458	0.5
Gaza	107	0.4	3	0.0	182	0.1	63	0.1	-	-	662	0.7
Inhambane	32	0.1	66	0.1	491	0.4	27	0.0	-	-	357	0.4
Manica	1,868	7.0	2,012	2.7	1,900	1.4	4,455	7.2	-	-	12,747	13.1
Sofala	135	0.5	662	0.9	13,640	10.4	3,105	5.0	-	-	26,785	27.5
Tete	12,813	48.1	42,920	58.2	3,920	3.0	6,610	10.7	-	-	5,705	5.9
Zambézia	1,115	4.2	3,060	4.2	5,565	4.2	568	0.9	-	-	6,570	6.7
Nampula	4,505	16.9	2,186	3.0	70,518	53.7	22,445	36.4	-	-	28,513	29.3
Niassa	6,040	22.7	22,542	30.6	2,536	1.9	6,689	10.9	-	-	2,677	2.7
Cabo Delgado	-	-	273	0.4	32,525	24.8	17,631	28.6	-	-	12,999	13.3
Total	26,635	100.0	73,725	100.0	131,284	100.0	61,593	100.0	-	-	97,473	100.0

Note: * The agricultural census 2000/01 does not include statistics on sesame.

Source: INE (2002, 2011)

maintain high stocks of carbon compared with annual crops.

Sesame, cotton and tobacco are probably the cash crops that contribute most to the change in forest cover. Since they are cultivated by the family sector, under outgrower contracts, in areas that are typically cleared annually for shifting cultivation and with few inputs, the production areas of these crops are very dynamic.

A new source of deforestation is the cultivation of sesame. The production of sesame increased dramatically in 2008, bypassing, in terms of area, the traditional crops of tobacco and cotton in 2009/10 (INE 2011).¹ The increase in area for

sesame production occurred due to the conversion of areas previously used for traditional crops (e.g. tobacco and cotton), but also due to the conversion of forest areas. In the Nhamatanda district, in Sofala, local producers believe that sesame cannot be produced twice in a row in the same area due to low production in subsequent seasons. This low production is caused by diseases and pests, particularly nematodes to soil, therefore, each year new forest areas are explored for production (Momade 2010). Although the price of tobacco (0.6–0.8 US\$/kg in 2005; 2.0 US\$/kg in 2011) is greater than the price of sesame, areas for tobacco production are restricted and do not seem to compete with sesame production.

The more pronounced changes are associated with the cultivation of staple food crops: 1.9 million ha against 748,000 ha of cash crops (Table 9). In general, while the cotton areas seem to have decreased over time, the areas of sesame and tobacco have increased significantly (INE 2010).

Arndt *et al.* (2010) suggest that producers convert some of the land now used to grow food or other cash crops to growing biofuel crops. In only some cases do they open new fields, suggesting that, for profit purposes, cash crops are located in areas accessible to markets.

¹ Since sesame was introduced as a cash crop in Mozambique in the 1990s, its production has been increasing, reaching US\$3 million worth of exports in 2006. The price of sesame (25–28 MZN/kg, price in 2010), compared with the price of cotton (5–11 MZN/kg price in 2010; 11.5–15.0 MZN/kg price in 2011), is more attractive, leading producers to opt for that crop. Hanlon and Smart (2008) report that family producers in the province of Nampula earned in 2006 the equivalent of US\$260/ha with sesame, compared to US\$160/ha for peanuts and only US\$5/ha for cotton. Recently, the newspaper *Notícias* reported that small producers of sesame in Mozambique (mainly from the province of Nampula) earned the equivalent of US\$6.75 million in profit from the sale of 10,000 tons of sesame.

Table 9. Changes in cultivated areas for the main staple food crops and cash crops, 2000/01 to 2009/10

Province	Food crops [ha]	Cash crops			Total change	
		Tobacco [ha]	Cotton [ha]	Sesame seed [ha]	Cotton + tobacco + sesame seed) [ha]	(Food crops + cash crops) [ha]
Maputo	87,645	-19	-7	458	432	88,077
Gaza	-14,891	-104	-119	662	439	-14,452
Inhambane	57,546	34	-464	357	-73	57,473
Manica	218,532	144	2,555	12,747	15,446	233,978
Sofala	253,854	527	-10,535	26,785	16,777	270,631
Tete	207,612	30,107	2,690	5,705	38,502	246,114
Zambézia	607,742	1,945	-4,997	6,570	3,518	611,260
Nampula	249,732	-2,319	-48,073	28,513	-21,879	227,853
Niassa	172,580	16,502	4,153	2,677	23,332	195,912
Cabo Delgado	63,479	273	-14,894	12,999	-1,622	61,857
Total	1,903,831	47,090	-69,691	97,473	74,872	1,978,703

Source: INE (2002,2011)

In short, deforestation in Mozambique from agriculture (food crops such as corn and beans and cash crops such as sesame, tobacco and cotton) is caused mainly by small producers from the family sector, in most cases working without inputs and using shifting cultivation. In general, small farmers use part of their area for food crops (mainly for subsistence) and another part for cash crops. This pattern differs from other countries such as Brazil, where the main agents of deforestation are extensive cattle raising and, increasingly, rural settlements of agrarian reform and land grabbing in areas without well-defined property rights (May *et al.* 2011). It is important to note that indirect effects of agricultural production impose additional pressure on forests, as in the case of fires used for opening of new fields, particularly in areas of shifting cultivation. These factors suggest that the combination of agriculture with the use of fire leads to deforestation.

1.2.3 Commercial logging

After a slowdown in forestry operations following independence (Box 5), logging has increased over the past 15 years. Operations are concentrated in the provinces of Zambézia, Cabo Delgado and Sofala.

The commercial logging of native trees is done through a selective regime (species and sizes). Although Mozambique's forest legislation recognises about 118 commercial species of timber, fewer than 10 species are effectively exploited for commercial purposes (including umbila, panga-panga, chanfuta, pau-preto and mondzo).

Mozambique defines two regimes of forest management: simple licence and forest concession (Table 10). Currently, most logging is done through simple licence (Ministry of Finance 2010). A revision of that scheme was approved in December 2011, increasing the duration of a simple licence from one to five years and from a limit of 500 cubic metres to 100,000 ha (Club of Mozambique, 08 December 2011). Due to weak enforcement of the regulation, the simple license scheme is very attractive and the volume of timber harvested can be almost double in relation to forest concessions (Republica de Mozambique 2012).

The main discourse in the forest sector is the gradual reduction of simple licences due to concerns about sustainability and capture of revenue. Although the number of simple licenses decreased (from 637 in 2007 to 479 in 2009), DNTF (2010) points out that the volume licensed

Box 5. Historical background of the forest sector in Mozambique

The period immediately after independence was characterised by widespread abandonment of forestry companies by their owners. Parallel to this situation was the collapse of the supply system for spare parts, resulting in an unprecedented crisis in the timber sector in the country; this prompted intervention and the nationalisation of most production units. In the late 1970s, the state created the state-owned Madeiras de Mozambique (MADEMO), which gathered all abandoned production units in a single company at the national level (Eureka 2001). This company had a monopoly on forest management and the processing and marketing of wood in the country, which ended up introducing the programme of economic restructuring in the mid-1980s. During this period, logging was done under a simple license. In each province, MADEMO delegations requested and paid for licenses for logging based on targets set centrally; concession-based logging had practically ceased to exist. The same situation occurred in relation to the few private companies that still operated in the country. The only experience of forest concessions in the country in the post-independence period, was the joint venture *Mozambique-Argélia de Madeira* (SAMOFOR), which negotiated with the government for a forest concession in Zambézia province (Nakala 1997). This concession was never operational due to intensification of the armed conflict in Zambézia as of 1985.

In 1999, the Law on Forests and Wildlife was approved, and regulations came into force in 2003, giving a new dynamic to the sector. These new instruments were guided by principles of sustainable forest management, including the promotion of forest concessions. However, several difficulties have prevented the operation of these instruments, and the timber sector confronts a series of problems characterised by unbridled exploitation of forests and inefficient use of forest products. Currently, the great challenge is to enforce the law and the regulation of forests to promote sustainable forest management (Nakala 2010). Illegal and unsustainable management are also gaining ground (Mackenzie and Ribeiro 2009).

Table 10. Main characteristics of the two regimes of forest management in Mozambique

Parameter	Simple license	Concession
Purpose	Commercial, industrial, energy use	Logging to supply an industry
Eligibility	Restricted to Mozambican citizens	Mozambican and non-Mozambican citizens and companies
Validity	Originally one year; in Dec 2011 became five years	50 years renewable
Maximum volume	Originally 500 cubic metres; in Dec 2011 became 10,000 ha	Not specified (established by its management plan)
Mechanisms to ensure sustainability	Topographic outline; logging plan, simplified management plan, verification of production potential	Topographic map, forest inventory, specification of timber species and quantities to be logged, design of annual logging compartments
Mechanisms to achieve the capture of benefits to local communities	Restricted to Mozambican citizens; community consultation, statement of the number of jobs created and other benefits for local communities	Negotiation of terms and conditions of logging with local communities, verification of other potential land-use plans, submission of the proposed plan for processing of products, statement of community participation and benefits, establishment of logging quotas, installation of processing plant prior to the issuance of an operating license, preferential employment for local communities
Income generated	Logging fee and reforestation fee equivalent to 15% of the value of the logging fee	Annual concession fee, logging fee based on the volume and species (reduced if operators supplying the domestic industry reforestation fee equivalent to 15% of the logging fee)

Source: German and Wertz-Kanounnikoff (2012), Club of Mozambique (2011)

in this logging regime is even higher (105,686 cubic metres in 2009) when compared with the volume licensed for forest concessions in the same year (57,268 cubic metres).

One of the virtues of the new regulation of forests and wildlife is the promotion of forest concessions (rather than simple licence) as a method of logging. By 2010, there were 179 forest concessions, of which 27% were located in the province of Zambézia, 20% in Cabo Delgado and 17% in Sofala (Table 11). Of the total forest concessions, only 111 have an approved management plan. In total, the concessions cover an area of more than 7 million ha (Nakala 2010).

The main destination of Mozambique wood is the Asian market, with a particular focus on China; to a smaller extent, it is also exported to neighbours such as Tanzania. For example, Ribeiro and Nhabanga (2009) report that in 2006, the port of Pemba, in northern Mozambique, exported 20,472 cubic metres of round timber (62% of all timber exported at the port) to China. Moreover, Canby *et al.* (2008) reported that over 90% (120,000 cubic metres) of Mozambique's timber exports goes to China. Mozambique entered the market of timber export to China in the late 1990s; in 2006, it was ranked the sixth largest exporter of forest products to China, sending 5.1% of its total timber exports to the country (Canby *et al.* 2008). Although the exact volume of the cross-border flow of timber is not known, there is evidence of timber trafficking across the border with Tanzania (Milledge *et al.* 2007, German and Wertz-Kanounnikoff 2012).

The influence of the Asian market for timber has affected the forest sector in Mozambique since the late 1990s. The high demand for species previously considered of low quality also caused changes in the forest areas of greatest importance in Mozambique. For example, due to the introduction of chanate and mondzo in the Asian market, Tete, which traditionally was not an important province in forest management and has no forest concession, increased the number of operators with simple licences from 44 in 2007 to 68 in 2009. Moreover, Tete provided the greatest volume of simple licences (23,900 cubic metres) in 2009 (Figure 6), placing itself among the three largest producers of timber (DNTF 2010).

Many studies (World Bank/WWF Alliance 2002, MacKenzie 2006, Ribeiro and Nhabanga 2009) indicate illegal logging operations in Mozambique that are not captured by official statistics. The National Directorate of Forests and Wildlife (DNFFB) estimated that, in 2003, illegal logging could reach 50–70% of the volume indicated in official statistics. This represents between 90,000 and 140,000 cubic metres of illegal logging per year (Anonymous 2011).

The presence of illegal logging activities suggests that forests in Mozambique are being degraded, and that their commercial value is being reduced by the overexploitation of a few species.

Illegal logging in Mozambique is characterised by logging without a licence and above the authorised quota, export of logs of species prohibited by law, and corruption, among other factors. These phenomena were reported in major timber-producing provinces such as Zambézia (MacKenzie 2004), Nampula and Cabo Delgado (Ribeiro and Nhabanga 2009).

The failure of many timber operators to comply with the regulations and the inability of forest services to enforce the law means honest operators have little incentive to respect the law. This spurs even more illegal operations, which degrade the economic value of forest and further weaken capacity to collect revenue for the sector. In April 2011, a new regulation increased the rate of over-exploitation of wood for the export of timber (20% of the Free On the Board price of wood) for unprocessed round timber and decreased 3% for finished carpentry. Perhaps this measure will serve as a disincentive to export unprocessed timber and will encourage local processing.

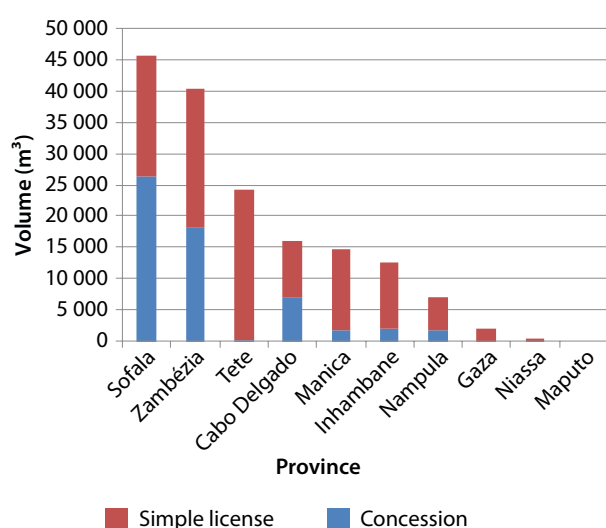
The impact of logging on the forest depends on techniques used. The regulation establishes the minimum felling diameter (DMC) for commercial species. The estimated volume of timber trade developed by the national forest inventory (Marzoli 2007) indicates a volume of 11 cubic metre/ha of commercial species, of which 4 cubic metre/ha is mature (trees above the DMC). Mature trees represent about 11% of the 36.5 cubic metre/ha of all species, or 2–4 trees/ha. At this level of exploitation, deforestation is not at an issue: the forest structure is rarely changed.

Table 11. Number of forest concessions issued per year, 1998–2010

Province	*2007	2008	2009	2010	Total	[%]
Zambézia	43	0	1	5	49	27.4
Cabo Delgado	25	6	2	3	36	20.1
Sofala	27	0	2	1	30	16.8
Nampula	15	3	1	0	19	10.6
Inhambane	5	7	4	0	16	8.9
Manica	9	1	0	1	11	6.1
Niassa	4	2	1	2	9	5.0
Tete	6	0	0	0	6	3.4
Gaza	3	0	0	0	3	1.7
Total	137	19	11	12	179	100.0

Notes: *Accumulated number, 1998–2007

Source: DNTF Statistics (2011)

**Figure 6. Volume licensed of simple licenses and forest concessions in 2009**

Source : DNTF Statistics (2010)

Nonetheless, the impact on species composition can be significant (e.g. when the operation does not comply with the DMC or when skid trails are opened carelessly, compared with low-impact logging, forest degradation may result). Moreover, it is important to note the indirect impact of logging operations: all forest operations open skid trails and other forest tracks of access to the forest to extract logs. Once the forest paths are opened producers of firewood and charcoal can easily penetrate the forest, especially given the current lack of oversight. Indeed, road rehabilitation or construction of new roads in areas previously

inaccessible or difficult to access also created easy access to the forest. Jansen *et al.* (2008) report the relationship between the proximity of the road and deforestation in Manica province.

In short, logging is governed by simple licensing schemes (mainly used by small operators in Tete and Zambézia – where the number of licences has been increasing) and concessions (used by large companies, mostly in Zambézia, Cabo Delgado and Sofala). The underlying causes of deforestation associated with logging include high demand for tropical timber in international markets, especially in Asia, and weak enforcement of national policies and regulations.

In principle, logging activities have a limited effect on carbon emissions, considering that the wood retains the carbon in its structure. Nonetheless, there are indirect effects due to careless and inefficient logging practices that reduce the stock of forest biomass and the burning of stubble (stems and branches not used) resulting from forest exploration and residuals of industrial processing.

Although there are no quantitative data on collateral damage of forest exploration and the volume of biomass burned in waste from sawmills, there are suggestions of other relationships with factors combined to reduce carbon stocks: use of paths opened by logging operations for the harvesting of firewood and production of charcoal, and use of fuel wood as source of energy in sawmills.

1.2.4 Uncontrolled fires

Uncontrolled fires in Mozambique are mainly of anthropogenic origin. FAO (2001) noted that over 90% of forests fires in Mozambique are caused by humans, 5% originate from natural causes and another 5% are of unknown origin. The main reasons for fires include opening of fields (shifting cultivation), but also hunting, honey harvest and charcoal production, as well as scaring away wild animals from rural residential areas. Most of these fires end with the burning of larger areas than intended, resulting in extensive areas of uncontrolled fires distant from the initial outbreaks.

Uncontrolled fires are an important source of emissions of CO₂ and other greenhouse gases. During the fire, large amounts of biomass (particularly herbaceous biomass, shrubs, leaves, dead branches and trunks) are charred. Studies of fires in Mozambique are scarce, but FAO FRA (2010) estimated the average area burned between 1982 and 1992 was more than 5 million ha. At the same time, it was estimated that the area burned between 2001 and 2002 varied from 1.6 to 8.8 million ha; the number of outbreaks of fires between 2001 and 2007 varied from 28,855 to 150,239 per year. About 28% of the total area burned was forest area.

Studies of fires in Mozambique, mainly concentrated in the north of the country, unanimously indicate that the main causes are related to human activities. Most fires probably originate from shifting cultivation. Ribeiro *et al.* (2008b) indicate the incidence of fires in the Niassa reserve is the largest in the district of Mecula; they occur primarily along the road, where main settlements are located. The root causes include poor adoption of new technologies for agriculture, which are associated with using fire to open new fields each year.

The incidence of fires is particularly high in central and northern Mozambique, reaching up to four fire outbreaks/square km in one dry season (June to October) (Figure 7). It is estimated that on average, during 2000 and 2002, approximately 4.42 million ha in Mozambique were affected by uncontrolled fires (Zucula 2003).

While fires do not directly produce deforestation and are part of the Miombo ecosystem, they can

degrade forests since they affect the processes of establishment and growth of trees. For example, Zolho (2005) found that regeneration of tree species in a Miombo forest in Nhambita, Gorongosa, was higher in unburned plots than in plots often burned. Ribeiro *et al.* (2008a, 2008b) found that woody biomass in the Niassa reserve was inversely related to the intensity and frequency of fires. Gandiwa and Kativu (2009), investigating the impact of fires in the Gonarezou National Park in Zimbabwe, found that within mopane vegetation, the average height and basal area of trees were greater in stands with lower frequency of fires.

1.2.5 Mining

The mining industry in Mozambique is reemerging as an important sector, particularly in the last decade. Mozambique has vast reserves (6 billion tons) of mineral coal, particularly in the provinces of Tete and Niassa (Selemane 2010). In addition to the Moatize area, survey and assessment of reserves are taking place in several other areas (Table 12). Mozambique has produced and exported coking coal from the Moatize mines.

Lack of clear and transparent procedures are calling into question the implementation of mitigation measures and rehabilitation of mining activity (Selemane 2010). Thus, the impact of mining activities on forest cover may be the result of several combined processes: the direct action of mining activities, the process of resettlement of populations in areas of mining concessions, and opening of access roads and construction of pipelines.

Mining activities can result in direct and indirect effects on forest cover. Access roads opened by charcoal and firewood producers, for example, can degrade forests and, potentially, lead to deforestation. However, evidence of the impact of mining in Mozambique is still scarce and, in general, the direct effect of mining on forests is limited. There may be macroeconomic effects that protect the forests (Wunder 2003). However, the continued discovery of underground natural resources (coal, gas and oil) in Mozambique – such as the recent discovery of coal in Niassa province in northern Mozambique – may mean a new threat to forests.

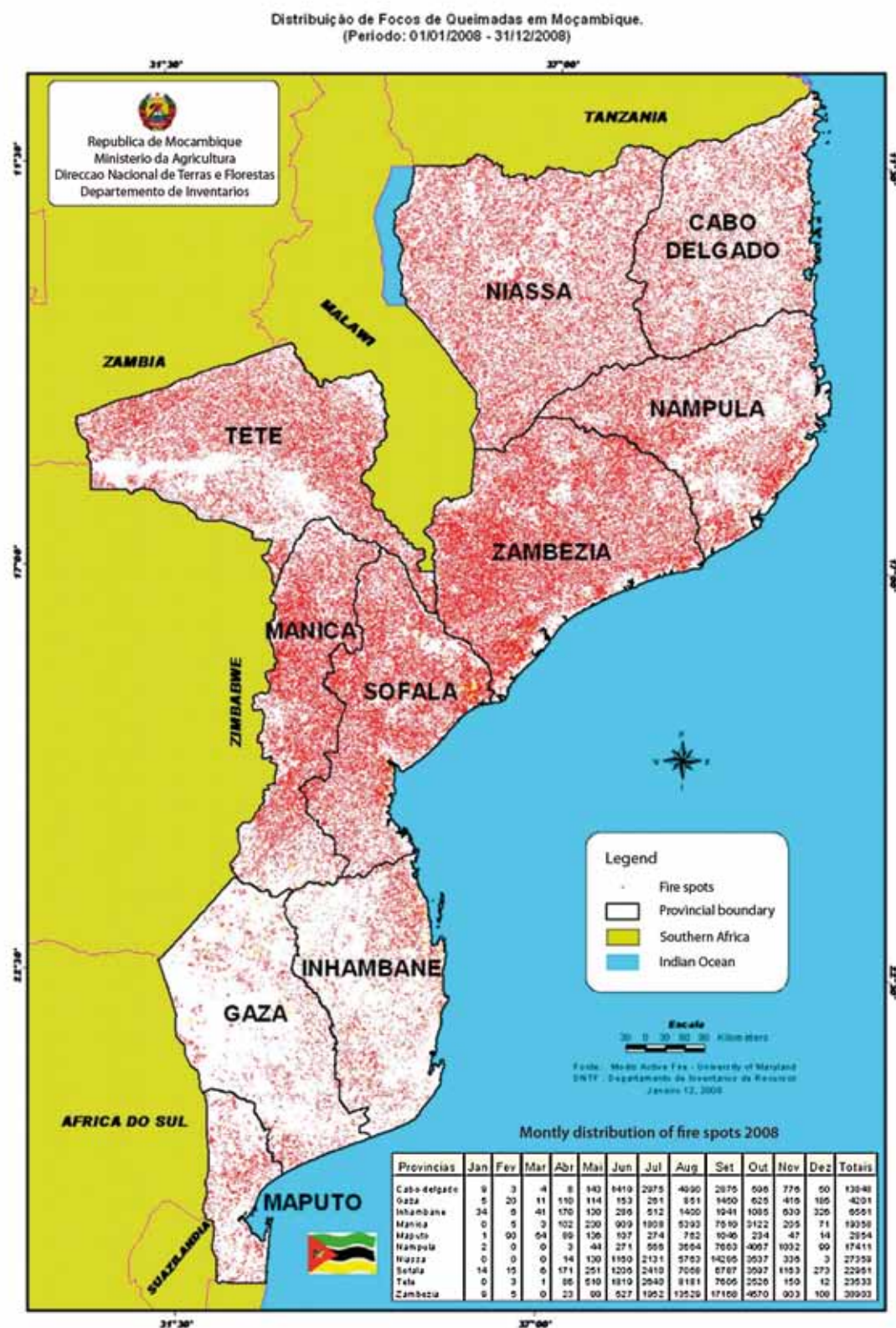


Figure 7. Distribution of fire spots from 1 January to 31 December 2008

Source: DNTF 2009

Table 12. Main mining projects in Mozambique

Project	Investor	Activity
Coal Project at Moatize (Tete)	Vale Mozambique (Mozambique, a subsidiary of Companhia do Vale do Rio Doce of Brazil)	Open pit mining, with a capacity at the full exploration stage of about 26 million tons of raw coal/year. It was expected to start producing in 2010. After the treatment of coal, about 8.5 million tons/year of coking coal and 2 million tons/year of burning coal will be produced, both for export
Mineral Coal Project of Benga (Tete)	Riversdale Mozambique (subsidiary of Australia's Riversdale)	This company obtained a mining concession for an area of 4.6 ha in April 2009 for 25 years. The company planned to begin mining coal in 2011, and may extend up to 2035
Heavy Sands Project (Nampula)	Kenmare (Ireland) (in Mozambique, Kenmare Moma Mining)	Kenmare has capacity to produce 800,000 tons of ilmenite, 56,000 tons of zircon and 21,000 tons of rutile annually. Kenmare's first exports took place on 14 December 2007

Source: Selemane (2010)

1.3 Potential for mitigation

The potential for mitigation must be understood first within the larger trend of urbanisation. The urban population has increased over the last three decades. Initially, the war brought an influx of refugees from rural to urban centres, which were safer. Limited access to rural areas has limited significantly the consumption of urban residents, particularly those dependent on natural resources such as firewood and coal and agricultural products. With the end of the war, access to rural areas has facilitated a rapid expansion of agricultural areas and exploitation of firewood and charcoal production. While some refugees who sought shelter in urban areas returned to the rural areas, a significant proportion remained in the cities, and yet, migration from rural areas to cities did not end with the end of the war, as many go to cities in search of better quality of life.

The potential of different sources of forest-cover change depend on the level of conservation of the carbon stock and the reduction of carbon emissions or increase of carbon stock, and the level of implementation of existing legal instruments that support the desired mitigation actions. The current potential also depends on political will, which will be partially analysed in Chapter 3 when discussing the economic policy of land use in Mozambique.

It is difficult to know the exact impact of each cause of deforestation and forest degradation on forest carbon (Table 13). The report on the inventory of greenhouse gases (MICOA 2011)

reveals the absence of a systematic baseline that would allow a reliable estimate. According to the analysis above, the most important sources of deforestation are agriculture and wood fuels (firewood and charcoal), which work in combination. The numbers indicating the relative dominance of agriculture over fuel wood are not available.

The analysis of the main factors of forest-cover change in Mozambique revealed the following underlying causes:

- demographic factors, especially increasing population density in urban areas (e.g. Maputo, Beira and Nampula) associated with demand for agricultural products and fuel (especially charcoal)
- technological factors, especially related to overcoming low agricultural productivity, charcoal production (low efficiency), and charcoal consumption (low efficiency of stoves)
- economic factors, such as those related to export markets for agricultural commodities (sesame seed, tobacco and cotton) and timber
- institutional factors, such as remarkably low institutional capacity, particularly at the sub-national (provincial and district) level and the difficulties associated with it as a result of poor enforcement of laws and regulations, as well as difficulties in pursuing perpetrators

Measures to mitigate the causes of forest-cover change are usually directed towards actions to improve productivity, agricultural technology and energy, tree planting, improving the efficiency of woody

Table 13. Assessment of the mitigation potential of the major sources of forest cover change in Mozambique

Causes	Comined causes	Actors	Main outbreaks	Potential for mitigation	Existing policies and regulations	Challenges	Comments
Firewood and charcoal	Logging, opening of roads, agricultural expansion	Small-scale producers, household consumers of charcoal and industrial consumers of firewood	Around cities and on the routes of access to these cities	<ul style="list-style-type: none"> - Use energy alternatives to firewood and charcoal combined with sustainable production of biomass energy 	Energy policy (expansion of electrification to all districts); New and renewable forms of energy; National strategy for reforestation	<ul style="list-style-type: none"> - many people depend on the participation in the charcoal trade; - sale of small amounts of energy alternative to charcoal - make profit out of forest-based energy 	There are several sources of energy in the country (e.g. gas), but the capacity for processing and distributing the various forms of energy and the access to these sources is often limited by the economic and social condition of the country
Agriculture	Firewood and charcoal	Small-scale farmers	Provinces in central and northern regions, more favourable to agroecology	<ul style="list-style-type: none"> - Intensify agriculture and control its illegal expansion - Concentrate farmers spatially to make mechanisation feasible 	Strategies for the green revolution, PAPA, PEDSA, etc., all aimed at the intensification of agriculture and increased productivity	Low production capacity, poor road network, limited market information	
Logging	Production of firewood and charcoal	Private investors in the reforestation sector	Niassa, Nampula and Zambézia	<ul style="list-style-type: none"> - Establish plantations on degraded areas that were deforested 	National strategy of reforestation	Identify and allocate formerly degraded and deforested areas for the past for the establishment of plantations	There are a few projects, there are few projects so far, though number may increase
		Small operators under a simple license	Northern and central provinces (Tete, Zambézia, Nampula, Cabo Delgado)	<ul style="list-style-type: none"> - Reduced-impact logging - Sustainable forest management 	Law and regulation of forests and wildlife, which promotes the reduction of simple licenses and their conversion into forest concessions	<ul style="list-style-type: none"> - Continuation of the simple license; - Consistent application of the laws and regulations of forests and wildlife; - Undemanding markets for forest products; 	The laws and regulations of forests and wildlife indicate the need to reduce the simple licenses, but implementation is very poor.

continued on next page

Table 13. Continued

Causes	Comined causes	Actors	Main outbreaks	Potential for mitigation	Existing policies and regulations	Challenges	Comments
Uncontrolled fires	Agriculture	Concessionaires	Central and northern provinces	- sustainable forest management	Legal regulation of forests and wildlife	Consistent application of the laws and regulations of forests and wildlife; Valuing forest goods and services other than timber	Working in combination with shifting cultivation
		Small-scale farmers	Central and northern provinces	- control of fires - training on fire management	Strategy to fight and prevent fires	Low capacity to adopt resources management techniques without fire	
Mining	Opening of roads, firewood and charcoal	Private-sector investors	Tete, Manica	- reducing emissions of deforestation and forest degradation	Assessment of environmental impact	Implementation and enforcement of the precepts of the environmental impact assessment	

biomass use, institutions and markets. At present, no assessment has been completed of the potential impact or effectiveness of these measures on carbon emissions and on the economy and society. A cost-benefit analysis will also be necessary to identify measures that are more efficient and that may also respond to the challenges of a developing country and a weak economy.

1.4 Capacity to monitor deforestation and forest degradation

Mozambique faces major shortcomings in terms of its capacity for measuring, reporting and verification (MRV) for REDD+. This was the result of an overall assessment of capacity gaps, defined as the difference between what is needed and what currently exists for countries to measure and verify the success of implementing actions of REDD using the Guidelines of Good Practice of the IPCC (Herold 2009). In fact, there are only two forest inventories (1997 and 2007) and limited capacity (both in terms of both human and technical resources) to continuously measure the change in forest area (currently there is no reliable information on the annual change in the existing forest cover). Moreover, there is no system of national carbon accounting or measurement of the impact of land-use changes.

However, Mozambique conducted an inventory of greenhouse gases in 2011 using the IPCC Guidelines (2006), which highlighted the lack of basic information on agriculture, forestry and land-use and land-cover change. Current initiatives for measuring forest-cover changes at the national level and for the establishment of monitoring capacity are underway by the Ministry of Agriculture, with funding from the Japan International Cooperation Agency (JICA). Research activities in pilot areas for testing of methodologies and development of local parameters are also in progress (Table 14).

Direct measurements of carbon present challenges, especially given the conditions in Mozambique. As a result, Mozambique does not have a survey of forest biomass and carbon. Information on biomass and carbon stocks was estimated for the FAO FRA (2010) using the parameters for semi-arid forests of the IPCC Guidelines (2006). Thus, forest biomass (stems, branches and roots) for 2010, at the national level, was estimated at 1,837 million tons, and the carbon stock was estimated at 900 million tons. Other detailed references are from small-scale studies in forest management units or in small regions (e.g. Tchaúque 2004, Machoco 2007, and other unpublished studies).

Table 14. Initiatives to develop skills for measuring, monitoring and verification of carbon stocks and forest-cover changes in Mozambique

Institution	Programme/Project	Method	Activity monitored	Coverage
Ministry of Agriculture (JICA)	Establishing a system for monitoring, reporting and verification for REDD+ in Mozambique	Satellite images, computer equipment and human and institutional capacity	Deforestation and forest degradation	National, with a focus in the pilot areas defined in the proposal of the national REDD+
Eduardo Mondlane University (FP7)	REDD Fast Logging Assessment and Monitoring Environment (REDD-FLAME)	Radar (and optical) high-resolution images acquired by Earth observation satellites	Development of a GIS application for monitoring tropical and sub-tropical forests	Mecuburi Forest reserve
Eduardo Mondlane University (FNI)	Development of national parameters for estimating the stock, emissions and removal of carbon in forest ecosystems	Satellite imagery, field observations and measurements, development of allometric functions	Development of national parameters	Beira Corridor (four districts of Manica and Sofala Provinces)

2 Institutional framework and distributive aspects

The institutional framework plays an important role in the definition of incentives to land use. This chapter reviews the most relevant institutional aspects for REDD+: the governance aspects in forest margins where forest cover changes are usually concentrated and the legal framework relevant to benefit sharing in Mozambique.

2.1 Governance in the forest margins

This section explores the conditions of governance in areas where deforestation and forest degradation are concentrated. First, we analyse relevant aspects of global governance, followed by an overview of the conditions of governance in high-risk deforestation and forest degradation areas before discussing REDD+ implications.

2.1.1 General context: aspects of global governance and international agreements

In the context of managing forest resources, Mozambique ratified various international conventions and regional protocols such as the Action Plan for Conservation of Biodiversity in the period 2003–2010 and the National Adaptation Programme of Action (NAPA) (Table 15).

2.1.2 Governance aspects in areas of high risk of deforestation and degradation

The major causes of forest-cover change, especially shifting cultivation, charcoal production and firewood collection, occur in all three major areas of the country (south, central and north), along roads and near urban centres (see Chapter 1). However, despite this diffuse distribution, it is possible to distinguish the central and northern

Table 15. Main international conventions ratified

Convention	Ratification	Ministry responsible
United Nations Convention on Biological Diversity (CBD)	Resolution No. 2/1994	MICOA
United Nations Framework Convention on Climate Change (UNFCCC)	Resolution No. 1/1994	MICOA
Convention to Combat Desertification (UNCCD)	Resolution No. 20/1996	MICOA
Convention on International Trade of Endangered Species (CITES)	Resolution No. 20/1981	MICOA
SADC Protocol on Forestry Activities	Resolution No. 1/2009	MICOA/MINEC
African Convention on the Conservation of Nature and Natural Resources	Resolution No. 18/1981	MICOA/MINEC

areas as those with major problems from illegal logging. Even though lack of technical and financial capacity is often used to justify problems affecting the forest sector, these are at the core of forest degradation and deforestation. It seems these problems are a result of widespread deficiencies in good governance of natural resource management, including non-compliance and lack of enforcement, political interference in administrative decisions (especially at the local level), corruption and lack of transparency and public participation in important decisions made in the sector.

To address some of these problems, some important steps were taken that should be noted:

- Improve the legal-political framework through the adoption of legal instruments (regulations, technical guidelines, etc.) to fill gaps.
- Establish a central office to combat corruption.
- Prepare the country for its inclusion in the Extractive Industries Transparency Initiative (EITI). Although this initiative is so far concentrated only in mining, civil society also has advocated the inclusion the forest sector.
- Institutionalise public participation (through community consultations for the allocation of land-use rights and licensing of forest concessions) and public consultations (in the context of environmental licensing). Mozambican civil society is involved in forest management through channels and formal and informal spaces created for this purpose, including:
 - National Forum on Forests (which meets annually, summoned and directed by the government, and includes representatives of various sectors)
 - Friends of the Forests Forum (informal advocacy movement for the protection of forests, created by a coalition of NGOs)
 - Working Group on REDD+ (multisectoral platform set up to monitor the process of drafting the national strategy on REDD+)

2.1.3 Implications for REDD+

The implementation of a REDD+ national strategy requires substantial improvement in governance of forest resources in the country. Its objectives cannot be achieved while there is a lack of law

enforcement, corruption, imbalance of power and political interference between the central and local level, among other problems.

The lack of political will overrides any existing capacity on the ground to properly manage the forest resources of the country. Testimonials of participants in training courses organised by the Center for Legal and Judicial Training (CFJJ) indicate that the domination of central power over local government prevents existing capacity from being fully used. REDD+, like other programmes for the sustainable management of natural resources, requires political will to ensure that its objectives are achieved.

The participation of civil society in decision making, especially in areas threatened by deforestation and degradation, will also be crucial to the success of a REDD+ national strategy. Thus, the weaknesses identified in consultation processes about allocation of rights to land and forest concessions should receive particular attention; otherwise, the main objectives of the strategy, namely the protection of community rights and fair compensation for environmental services, could be undermined. In this context, the clarification of the relationship between land rights and rights to forests is crucial to the achievement of those objectives.

2.2 Decentralisation policies and benefit sharing

For a better analysis of the institutional context relevant to REDD+ benefit sharing, this section revisits the existing provisions and mechanisms of decentralisation and benefit sharing, followed by a discussion of the implications for REDD+.

2.2.1 Provisions on decentralisation and benefit sharing in the sectors most responsible for forest-cover change in Mozambique

Agriculture and energy are the main sectors responsible for forest-cover change, followed by the forest sector through logging activities (see Chapter 1). An examination of decentralisation mechanisms of forest management adopted in the country, and their implementation, indicates that, in general, decentralisation is incomplete: it gives some autonomy to the provinces but does

not extend to district governments. It also reveals an important role for community participatory initiatives (Table 16).

2.2.2 Benefit-sharing mechanisms in the main sectors causing forest-cover changes

Forest sector legislation (Law on Forests and Wildlife, 1999) foresees the return of 20% of logging fees to communities as a way to pay them for maintaining forests. It also foresees the allocation of 50% of fines to communities by community agents involved in the monitoring of forests and wildlife, and who detect and report offenders.

In addition to the sharing of benefits between the state, enterprises and local communities, it is important to mention the issue of benefit sharing within the public administration. The districts are governed by a five-year District Strategic Development Plan (PEDD), which establishes

the territory's economic and social development priorities. Targets included in the PEDD are operationalised annually through the District Economic and Social Plan and Budget (PESOD). Both the PEDD and PESOD are approved by the District Advisory Council (F. Siteo, personal communication, 10 October 2011).

Since the value of the logging fees is channeled to central finance following the principle of non-assignment, the districts do not benefit directly and substantially from the income generated by exploitation of natural resources in their areas of jurisdiction. However, the budget allocation to support the district development fund uses criteria such as the poverty index, the number of inhabitants of the district, the surface area occupied by the district and the level of revenue earned. It is estimated that every district receives 15 million meticaís (ca. US\$ 550,000) each year from the central government for the implementation of local initiatives. This value can represent up to 90% of

Table 16. Instruments for decentralisation and its implementation in practice

Legal instruments guiding decentralisation	Decentralisation in practice
Law of Local Organs of the State (LOLE)	Decentralisation is for districts, but not across sectors since at this level the management of forests and other natural resources is coordinated by a single sector, the District Services of Economic Activities Governments of the provinces now exert some autonomy, but a similar autonomy (or decentralisation) is not transferred to district governments. As a result, districts receive practical instructions not only at the national level, but at the provincial level, which can result in confusion in cases where these instructions are contradictory – a reality that is not uncommon
Constitution of the Republic (Article 98): Community public domain on natural resources	This was created to ensure equitable and sustainable rural development, where poor rural communities have a voice and power in decision making related to management of land and other natural resources. The concept of 'public domain' and its legal system still need to be integrated into ordinary legislation
Forests and Wildlife Law (1999) (Article 33): Delegation of powers over forest resources management	The government may delegate power to manage forest and wildlife resources to institutions in other sectors such as civil society, the private sector and local communities. Rules for the implementation of this legal provision have not been established. Delays have been criticised and interpreted as reflecting the state's resistance to delegating powers and rights over natural resources management to local communities. Yet they have already received these powers through the forests and wildlife legislation and its regulations obligate them to participate and contribute to conservation
National strategy for promotion of community integrated management of natural resources (2010)	While this strategy, produced in 2010, has not yet been approved by the government, about 70 community management initiatives have been at different stages of implementation since the late 1990s. Most are dedicated to the promotion of community participation in the management of forest resources, with different levels of success

the district's spending, but constitutes only 1.5% of the state budget at the national level.

Once the central government controls allocation of rights to access and use large plots of land and large forest concessions, it also controls licensing fees and exploitation of resources; this leads to far lower participation of districts in decisions about the distribution of income collected, as well as in negotiating contracts for major investments in the forestry sector.

We recognise the country's recent efforts towards decentralisation of public administration and sharing of benefits generated by the exploitation of forest resources and other resources. However, the general context is still characterised by an irregular and not very substantial channeling of benefits from forest exploration to districts and communities, both by the state and companies (DNTF 2010).

2.2.3 Implications for REDD+

The institutional context of Mozambique already has relevance for REDD+. Examples include real decentralisation of provincial governments, the existing legal measures that provide for benefit sharing (e.g. return of 20% of logging fees to communities) and the support given to community initiatives. Some other areas, however, will need more support under REDD+. These include the local level (districts), which are still quite vulnerable due to lack of human resources, finance and technology, as well as lack of power to make decisions on the allocation of large land concession.

Revenues from forest exploration are collected in the ministries and the provinces, not the districts. Only 20% of forest exploration rates are explicitly set to return to communities, while the rest of the district budget is subject to other criteria. As mentioned above, a specific amount is not reserved to support the operation of the districts. Consequently, as centres of national development, the districts need a clear mandate to decide about the use of natural resources. This can only come about through transfer of the necessary power, technical knowledge and human capacity (numerical, technological and financial); this can ensure both planning and supervising of the use of forest resources and, therefore, reverse the causes

of deforestation and degradation and ensure the benefit of rural communities.

In this context and at the grassroots level, it also seems necessary to ensure a balance between the income for the private sector and benefits of the communities. Communities need to be empowered to participate effectively in consultations, to negotiate partnerships and to create formal groups.

2.3 Land tenure rights, forest and carbon

In Mozambique, the Land Law of 1997 is the main source of regulatory procedures for land management. By law, the land is state property and cannot be sold or alienated. The main element is the Land Use Right Certificate (DUAT). DUATs can be acquired through inheritance and by peaceful occupation of individuals and rural communities for at least 10 years according to traditional norms and customs. The DUAT can also be acquired through approval of a request to the Public Administration. The absence of title does not affect the recognition of the right acquired by individuals and local communities, which is not subject to time limits. The DUAT for economic purposes, required by national or foreign investors, must be authorized and has a validity of 50 years subject to renewal.

The Land Law of 1997 has been considered exemplary because of the innovative way it deals with customary law and the balance it seeks to establish between community rights and investor rights (Hanlon 2002, World Bank 2010, German *et al.* 2011).

Most irregularities have to do with community consultations. They include failure to undertake consultations and falsification of consultation records; low-quality consultation process (including the refusal of public officials or intermediaries to honour the boundaries of community areas); consultation with only one part of affected communities; corruption acts where local leaders receive bribes for consent to transfer land, including occupied land; authorisation of transfers of land by local leaders, even with opposition from the affected communities; use of maps by intermediaries at a scale that does not allow the identification of community land; lack

of registration of existing land titles in the affected areas; approval of titles without registration of the minutes of the consultations; consultation with local authorities without the knowledge of district authorities; little knowledge about how transfers affect communities; lack of verification of the level of compliance with management plans prior to issuing definitive titles; and political pressure from government officials about the districts to receive approval of investments (Hanlon 2002, FIAN 2010, Vermeulen 2010).

Corruption is considered endemic at all levels, where people in positions of authority (military, party elites and district administrators) use their power to secure land for their own benefit. In addition, there are conceptual problems, in which, for example, lands not being used are considered unoccupied lands. There is also legal vagueness regarding terms such as 'consultation' and 'representative'. Meanwhile, there has been a marked growth both in the number of requests for access to land and in the size of the requested areas (German *et al.* 2011).

Still, there is no clear information on the spatial distribution of the rights of land use and forest concessions. In fact, the poor organisation of land registry, both rural and urban, is seen as a contributor to the problems faced in the sector. In particular, conflicts are exacerbated by the absence of free and institutionalised mechanisms for monitoring, supervision and resolution of disputes in administration and land management.

It is important to note that although land rights can be acquired, these rights are incomplete. According to the definition of property rights offered by Schlager and Ostrom (1992), property rights can be broken down into the following four categories:

- **Right of access and collection:** the right to enter a particular area (e.g. forest area) and the right to obtain products of a resource (e.g. collection of non-timber forest products).
- **Right of management:** the right to regulate how, when and where you can harvest products from a resource (e.g. forest) and determine if and how the structure of the resources can be changed (e.g. improvements).
- **Right of exclusion:** the right to determine who should have access to the resource and how this right may be transferred.
- **Right of alienation:** the right to sell or dispose.

In the case of Mozambique, and with regard to the rights of rural communities and citizens to use and benefit from land, we can say that it is a situation of a 'quasi-right' over property; it is limited by the right of the state to full ownership and by the fact that land cannot be sold or alienated. Another limitation is that the right of access and land use does not incorporate, necessarily and automatically, the right to use and benefit from other resources such as forests, minerals and water for purposes other than subsistence. The concept of 'subsistence', usually relating to absolute poverty, needs to be revised if communal natural resources are to promote local development with any hope for real economic and social progress above the traditional threshold of subsistence. Community authorities also lack influence to affect private-sector decisions regarding land investments.

2.3.1 Implications for REDD+

Nhantumbo and Salomão (2010) and Salomão (2011) conclude that Mozambique has one of the most progressive and appropriate political-legal contexts for the promotion of sustainable development. Mozambique seeks to balance social, environmental and economic issues, paying special attention to rural communities. The focus on the protection of rural communities' rights to access and use land and other natural resources, in Mozambique, has become an international benchmark (Cotula 2011).

Among the most pressing problems related to administration and land management is the divergent interpretation of the constitution and laws concerning the content of the DUAT; some interpretations result in land-tenure insecurity and threaten the rights of the poor. Since land and other natural resources are the property of the state, it is important to clarify the contents of DUAT in terms of rights, powers and obligations of the holders, especially regarding carbon rights.

In addition, the problems identified in community consultations regarding the allocation of the

DUAT have been of great concern to civil society organisations and a source of conflict between investors and communities. These problems include the vitiation of processes (incomplete and late information, selective participation, etc.) and the general tendency of government agents to defend investors' interests (CFJJ 2010).

In the context of REDD+ or other programmes that promote conservation of natural resources, it is important to promote the registration of land belonging to communities and the poorest citizens, as well as the formation of beneficial partnerships among investors, the state and rural communities (Salomão 2011).

Currently, the most important issue for the discussion on REDD+ in Mozambique is the need to harmonise the legal right to use and benefit from the land (DUAT) and the legal right to use and benefit from the forests, which could be abbreviated as DUAF. The DUAT does not confer to national holders and rural communities the right of access to forest resources except for subsistence purposes. The exploitation of forest resources for economic purposes by communities, even within common areas, requires state authorisation. The state also unilaterally decides on private-sector applications for forest concessions in community areas.

3 The political economy of deforestation and forest degradation

The political and economic context in which land-use decisions are made is important for a better understanding of the underlying causes of forest-cover change. Thus, this chapter focuses on the broader context in which the sources of deforestation and forest degradation operate. Specifically, it will describe the national economy (including the relevance of international markets) and national development priorities.

3.1 Overview of the national economy

After almost 30 years of armed conflict ended in 1992, the country has been undergoing major

improvements in its socioeconomic development. Despite a stabilization of the poverty rates and inequality during the past five years, other indicators suggest improvements (Table 17). According to the strategy of poverty reduction (PARP 2011–14), Mozambique had an average annual GDP growth of 7.6% between 2005 and 2009, and an average annual increase of per capita income of 5% (República de Mozambique 2011a).

Agriculture is a key sector for the national economy of Mozambique. In 2009, agriculture contributed 23% to the country's GDP

Table 17. Some indicators of socio-economic development in Mozambique

Indicators	Change	Comments
Human development		
Access to education	Increase from 30.8% (2002/03) to 37.3% (2004–2008)	
% Illiteracy among women	Reduction from 54% to 40.8% (2004–2008)	Includes progress in reducing the gender gap in school admissions
Access to health services less than 45 min away	Increase from 55% to 65% (2002/3–2008/09)	Further gains in rural areas (especially in the north), compared with urban areas
Infant mortality	Reduction (per 1,000 live births) from 245.3 deaths (1997) to 138 deaths (2008)	Gender and age differences persist: women, children and elderly are most vulnerable
Poverty		
Incidence of poverty	Reduction from 69.4% (1996/97) to 54.1% (2002/03) to 54.7% (2008/09)	While urban poverty decreased from 1996/97–2008/09, rural poverty increased between 2002/03 and 2008/09 from 55.3% to 56.9%
Inequality	Gini coefficient remained unchanged between 2002/03 (0.42) and 2008/09 (0.41) at the national level	

Source: República de Mozambique (2011)

(INE 2011). In 2010, 80% of the total economically active population worked in agriculture (FAOSTAT 2011). According to the latest agricultural census of 2009/10 (INE 2011), and despite the government's interest in attracting international investors to the agricultural sector, the number of large agribusinesses remains limited and the sector continues to be dominated by small farmers. The major cash crops in Mozambique, mainly for export, include tobacco and cotton (see also Chapter 1).

The industrial sector is another important sector for the economy of Mozambique – about 24% of the country's GDP in 2009 (IFAD 2010). Although currently the main contribution of this sector originates from the MOZAL (an Australian-owned aluminum processing plant), strong interest in mining activities is expected to generate future activity. In the coming years, the mining sector may well contribute 7% to 10% of GDP due largely to coal projects in Benga and Moatize, Tete (*Jornal Notícias* 2011).

The increasing importance of the sector is largely a result of a series of institutional, sectoral and legislative reforms in 2002–2006 within the scope of a multilateral project of US\$ 38.4 million (World Bank 2010). The increasing international interest in investing in mining in Mozambique is also due to the discovery of immense coal deposits in Tete province. The Vale Moçambique, a subsidiary of the Brazilian company Vale do Rio Doce, has been leading efforts to secure control over coal mines that have been called the Tete Coal Rush.

3.2 National development priorities

Several national development priorities are related to forests, including the following:

- **Agricultural development through intensification (green revolution):** Mozambique's agricultural policy focuses mainly on food security (República de Mozambique 2008) and, more recently, on agricultural intensification. Key policy documents therefore include the Agrarian Policy of 1995, the Green Revolution Strategy 2007, the Agricultural Action Plan 2008 (Plan of Action for Food Production or PAPA) and the Strategic Plan for the Development of the Agricultural Sector (PEDSA), approved in May 2011. The idea of 'green revolution' was a recurring theme in regard to agricultural policy through which the government hopes to attract big investors. Until now, however, the idea is not concrete and remains largely at the level of discourse (Club of Mozambique, 27 May 2009). There are few large-scale agricultural projects in Mozambique, partly due to limited incentives.
- **Biofuels:** Mozambique is considered to have one of the greatest potentials for biofuel production in Africa. The country adopted a Biofuel Policy and Strategy (República de Mozambique 2009), but several projects were approved even before the strategy was adopted. In 2008, there were 16 biofuel projects proposed or in different stages of development or implementation, covering an area of more than 2.3 million ha (Nhantumbo and Salomão 2009). Besides the risk of additional competition for land use (with mining and agricultural projects), weak enforcement of regulations and implementation of policies, the development of biofuels in degraded areas of Mozambique tends to be limited by low soil fertility (Nhantumbo and Salomão 2009). This could increase the risk of competing with other uses on fertile lands (especially for food and cash crops).
- **Reforestation strategy:** The National Reforestation Strategy (República de Mozambique 2006a) outlines plans to establish at least 2 million ha of tree plantations and the zoning of an additional 3 million ha to make them available to potential investors (Nuñez and Ribeiro 2006). The north and central regions were suggested for forest plantations, whereas sugar plantations for biofuels have been proposed for the southern region. Since the mid-2000s, there has been growing interest in the development of forest plantations on a large scale. Currently, most investments are located in the provinces of Niassa and Nampula, but some investors are also focused on Zambézia, Sofala and Manica (DNTF 2010).
- **Mega-projects, including mining:** The mining industry plays an important role in the national economy. By government estimates, the country will produce 95 million tons of coal per year starting in 2015, possibly placing Mozambique

Table 18. Overview of key policy priorities in sectors that affect forest-cover change in Mozambique

Sector	Objective	Political documents	Impact on forests	Challenges for implementation
Energy	Biofuel development	Policy and strategy for biofuels (República de Moçambique 2009)	(–) The allocation of large areas of land for investment in biofuels has the potential to adversely affect areas of food production or forests (Nhantumbo and Salomão 2010)	Weak capacity of public institutions to enforce laws (Nhantumbo and Salomão 2010)
	Expansion of access to energy	Strategy of development of new and renewable energies (2011)	(+) The use of alternative sources of energy and its promotion for disadvantaged urban groups can reduce deforestation associated with the cutting of firewood and charcoal production	Access to electricity (and other energy sources) is not enough for people to adopt this energy source, especially for the kitchen, since there are other associated factors such as investment in a stove (Egas 2006)
Agriculture	Food security	Agrarian policy (1995) Food production programme (República de Moçambique 2008)	(–) Increased agricultural production has been, until now, due to the increase of agricultural areas (MINAG 2010), which reduces forest area	
	Agricultural development	Strategy of the green revolution (2006)	(+) Promotes intensification of agriculture, which has the potential to reduce pressure on forests. (–) Increased demand for land for agricultural investments (e.g. soy, rice, and cotton to China) may result in deforestation	Weak development of the agricultural extension network in the areas of production; pressure (“rush for land”) by foreigners (e.g. Brazil, China) to produce for the international market
Forests	Reforestation	National reforestation strategy (República de Moçambique 2006a)	(+) Plantations have the potential to reduce pressure on natural forests due to demand for forest products, including firewood and charcoal	The weak institutional capacity to strengthen the implementation of associated regulations can result in the replacement of natural forests by plantations
	Sustainable forest management	Forest and wildlife law (República de Moçambique 1999) + regulation of forests and wildlife (2002)	(+) Promotes use of forest concession system for a sustainable forest management	Massive demand for timber, especially for the Asian market, combined with weak forest governance
Mining	Environmental considerations in mining activities	Mining law (República de Moçambique 2002)	(+) Promotes rehabilitation of degraded areas to replenish forests that were inevitably cut during mining operations (–) Allows exploration and exploitation in all types of lands (including conservation areas), which creates potential for deforestation	Lack of clear and transparent procedures to ensure that mining companies will implement rehabilitation measures (Selemane 2010)

Additional sources: República de Moçambique (2011a,b)

among the top 10 world producers. ‘Mining represents now 1% of GDP, but it is expected that soon it will be the main activity, reaching 30% of the economy’, said Esperança Bias, minister of mineral resources (Borges 2011). Presently, unlike with forests and wildlife, the Mining Law does not provide for benefit sharing with local communities. Thus, benefits to local communities are limited to jobs, which can still help improve life for rural families that usually do not have many alternatives for income generation. This household income can be used as an entry point to change the way of life of populations and their relationship with natural resources.

Given the importance of agriculture to the economy of Mozambique, the sector plays a key role in the development plans of the country. In the recently published update of the Action Plan for Poverty Reduction (PARP), the development of agriculture and fisheries (both for food security and commercial purposes) is among the top three key objectives.

Potential conflicts of these national development priorities with conservation and sustainable forest management may arise from (1) promotion of agricultural development and leasing of land for major agricultural projects (Cotula 2011), including the production of biofuels; (2) promotion of reforestation, especially when done in forest areas; and (3) mining concession within conservation areas (Bartolomeu Soto and Oraca Cuambe, personal communication).

At the same time, Mozambique national strategies recognise the role of forests in climate change mitigation and adaptation (Table 18). In the context of PARP 2011–14, one priority is to improve the sustainable management of natural resources (land, water, fisheries and forest), and one strategic objective is ‘to adopt measures to reduce disasters and to adapt to climate change’, including measures related to forest-based climate change mitigation (República de Mozambique 2011a).

4 The political context for REDD+: Actors, events and political processes

This chapter deals more specifically with the process of developing the national strategy for REDD+. First, it presents basic information on options for REDD+ under discussion, the political processes and the main actors involved and the main political events. It then presents an initial analysis of the main incentives and governance aspects relevant to REDD+ in Mozambique. Finally, it provides basic information about the consultation process of the R-PP (Readiness Preparation Proposal for REDD+).

4.1 Political context for climate change

Mozambique has few policies and experiences specifically related to climate change. These include:

- The National Adaptation Program of Action for Climate Change (NAPA), established in 2007, which is currently under review.
- At least one project under the Clean Development Mechanism (CDM), in the validation phase.
- Some operational experience from ongoing projects on forest carbon associated with the voluntary carbon market – probably the only area in southern Africa based on payment for performance (as this is an idea from REDD+). In the first project begun in 2002, Envirotrade has made (since 2007) payments to farmers and local communities for services of carbon sequestration through the adoption of agroforestry systems, forest conservation and control of fires. Similar projects are being established in the Quirimbas Archipelago and in Cabo Delgado and Zambézia.

- The National Institute of Disaster Management (INGC) has been leading the implementation of climate change mitigation and adaptation projects in some regions that will potentially be the most affected.

4.2 Actors, events and political processes related to REDD+

This section will provide a snapshot of the national REDD+ process in Mozambique in January 2012. After an overview of the political process, it will describe the most important political events and the major actors involved.

4.2.1 Political processes

The political process for REDD+ in Mozambique began in 2008 with the development and submission of the Readiness Project Identification Note (R-PIN) to the Scheme for Forest Carbon Partnership Facility (FCPF), managed by the World Bank. From that point, the process for developing the proposed strategy on REDD+, including consultations, was based on a collaboration agreement between a Brazilian institution (Amazonas Sustainable Foundation or Fundação Amazonas Sustentável – FAS) and the Ministry for Coordination of Environmental Affairs (MICOA). A South-South collaboration between the two institutions was established in pursuance of the initiative of the Minister of the Environment, Alcinda Antonio de Abreu, during Conference of Parties (to the United Nations Climate Change Convention) 14 in Poznan in 2008 (Box 6). This collaboration and the activities related to it were the central elements of national REDD+ activity during 2009–2011. Table 19 and Figure 8 summarize the main events of the process.

Box 6. Memorandum of Understanding between the Government of Mozambique (through MICOA) and the Amazonas Sustainable Foundation (FAS), Brazil

The success of the initiatives of the Bolsa Floresta and the Juma Project in Brazil attracted the interest of other countries who wanted to develop similar initiatives. The FAS responded to this interest in March 2009 by organising, in partnership with the International Forum of Readiness for REDD+, the Woods Hole Research Center, the Meridian Institute and Idesam, a workshop on South–South cooperation for REDD+ between Brazil and Africa. During the event, which was attended by 15 African countries, FAS (represented by Professor Virgilio Viana) and MICOA (represented by the Minister for Coordination of Environmental Action, Alcinda Antonio de Abreu) signed a Memorandum of Understanding (MoU) with the intention to replicate the *Bolsa Floresta* Project and the Juma REDD+ Project in Mozambique. The MoU highlighted the need to consider the social, environmental and political contexts of Mozambique; it also established a commitment to exchange experiences and evaluate progress in implementing a mechanism similar to that in operation in Amazonas.

Based on the MoU, FAS initiated a study with IIED in March 2009, which discussed the partnership between FAS and MICOA, as well as the potential role of IIED. This collaboration is expected to result in a book entitled ‘Lessons Learned from Sustainable Development in Practice’ and provide the basis for future research on REDD+, including this project.

As part of the MoU between the FAS and MICOA, representatives from MICOA and MINAG visited the Amazon in May 2009, while the director of the FAS visited Mozambique in June of that year. During the technical visit in May, representatives began elaborating the South–South Cooperation Project and the studies for pilot projects that are part of the REDD+ National Programme.

It is important to note changes in priorities in the first half of 2010 – the decision to put the REDD+ Readiness Preparation Proposal (R-PP) of the World Bank on hold so the government could first design the National Strategy on REDD+. To save time and resources, the government decided to coincide the process of R-PP with the process of designing the strategy for REDD+. In mid-2010, a preliminary version of a national strategy was finalised for internal consultation within the government. In 2011, the government also proceeded with the preparation of PP-R, developing a preliminary version in August of that year, and submitted its final version in January 2012.

The main actors in the process of REDD in Mozambique include members of the government, academia, civil society and the private sector (Table 20). They correspond to those involved in the Working Group on REDD+ established in 2009 in response to the aforementioned south-south cooperation between MICOA and FAS, and reflect a significant involvement of outside actors (IIED, FAS, Indufor) in the national process (Figure 9). The most dynamic actors in

the political and technical terms are MICOA, MINAG, UEM, IIED and CTV, suggesting that national actors ‘own’ the REDD process.

So far, the government of Mozambique, represented by the various relevant institutions, especially MICOA, MINAG and INGC, has led national interventions on climate change. However, in the REDD+ context, the participation of civil society, academia and the private sector has been remarkable, especially in promoting discussion and dissemination of information about REDD+, holding consultations and implementing pilot projects.

4.3 Process of consultation and platform of stakeholders

4.3.1 Process of consultation for R-PP

In Mozambique, the development of R-PP (the official version was submitted in January 2012) was closely related to the process of drafting the National Strategy for REDD+. Thus, consultations for the latter process were considered relevant to the R-PP document, and are described in more detail in the following section.

Table 19. Main political events of REDD+ in Mozambique

Date	Event	Main decisions/results
12/2008	R-PIN	
03/2009	Workshop for South-South Cooperation for REDD+ between Brazil and Africa	The FAS, represented by Professor Virgilio Viana, and MICOA, represented by the Minister for Coordination of Environmental Affairs, Dr. Alcinda Antonio de Abreu, signed a Memorandum of Understanding (MoU) with the intent to replicate the example of the Bolsa Floresta Project and Juma REDD+ Project within the context of Mozambique
08/2009	Study of the Miombo ecoregion	
08/2009	First national meeting on REDD+	The National REDD+ Group was formed and approved an action plan (road-map) for the participatory preparation of EN-REDD
04/2010	Regional (southern, central and northern regions) and provincial consultations	The plan initially approved by the National REDD+ Group in August 2009 was altered and replaced by an accelerated and simultaneous process of consultations, data collection and drafting of the EN-REDD document
08/2010	Delivery of the proposal (first version) of the national strategy for REDD+ by REDD+ Working Group to MICOA	First version of EN-REDD completed and submitted to MICOA to start the consultation process
08/2010	JICA initiates activities to support the process of MRV	JICA starts technical support activities for the design of a monitoring system for REDD+
12/2011	JICA initiates activities to support the process of MRV Presentation of the proposed national strategy for REDD+ to CONDES (Council for Sustainable Development)	Suggestions for the harmonisation of the proposed REDD+ proposal with other policies and sectoral strategies
12/2010	Preparation of the extension phase of the South-South cooperation programme	Norwegian government approves financial support for consultation, training and delimitation of some pilot areas on REDD+ for the period of February to August 2011
02/2011	Presentation of the proposed REDD+ strategy to international cooperation partners	The partners reaffirmed their support for the implementation of REDD+ strategy
03/2011	Presentation of the proposed REDD+ strategy to permanent secretaries of the various sectoral ministries	Suggestions of changes to the form and content were given to the National REDD+ Group
05/2011	Meeting of the Working Group on REDD+ with the World Bank	Planning the preparation of R-PP
07/2011	Public consultations on the potential of REDD+ pilot areas	Collecting impressions about the proposed REDD+ strategy
07/2011	Capacity building training on REDD+ in all provinces	Spreading basic awareness about REDD+ among employees of state institutions, civil society and the private sector
08/2011	Submission of initial proposal of the R-PP to the World Bank	Pre-submission of the proposed R-PP
01/2012	Submission of the R-PP to the FCPF	Approved in March 2012

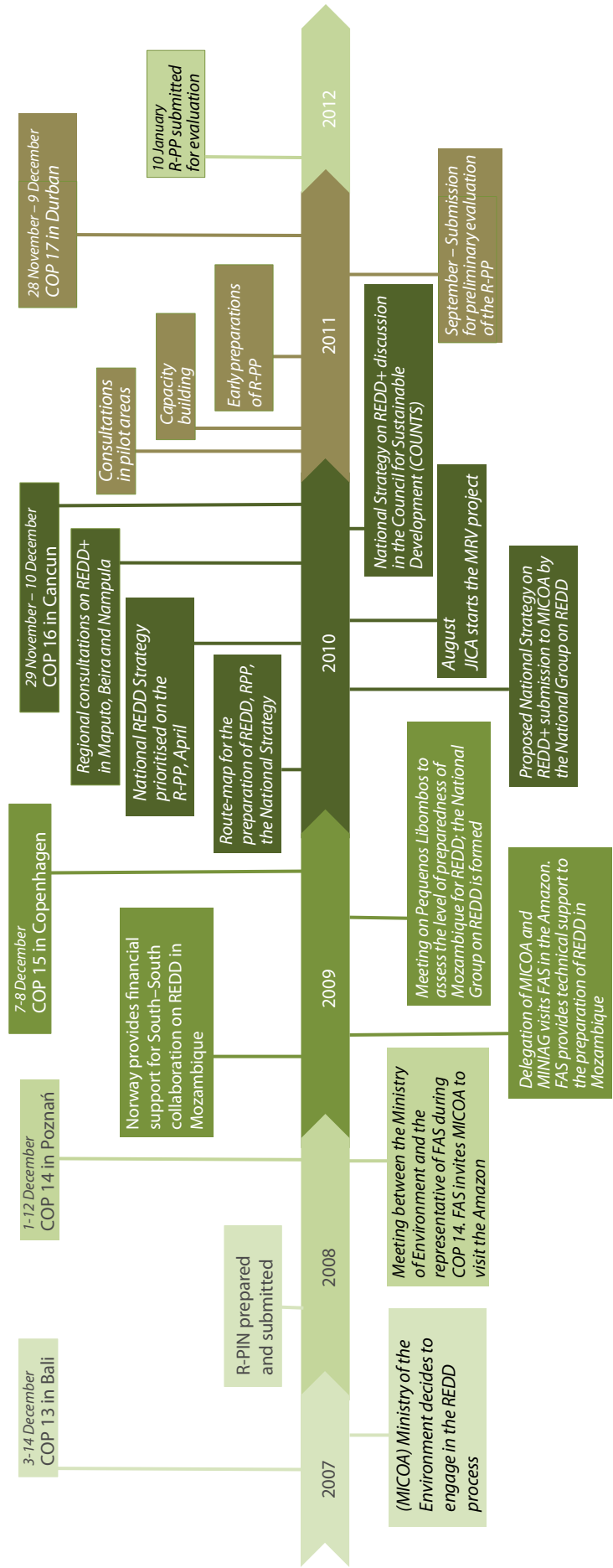
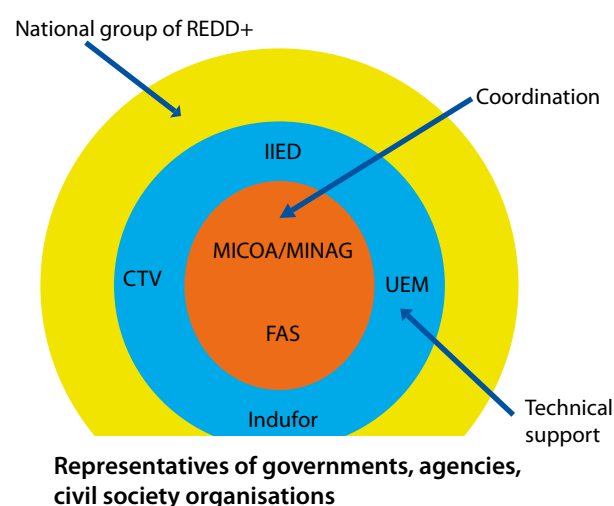


Figure 8. Process of REDD+ in Mozambique, 2007–2012

Table 20. List of the main actors involved in the REDD+ process in Mozambique

Actor	Function
Government	
Ministry for Coordination of Environmental Affairs (MICOA)	Coordination (led the R-PP in 2011/12)
Ministry of Agriculture (MINAG)	Coordination (led the R-PIN in 2008) Technical expertise and political authority over forests
INGC	
Academia	
Eduardo Mondlane University	Technical advice, especially about MRV and biophysical aspects
Civil society	
Fundação Amazonas Sustentável (FAS)	Coordination Technical advice
International Institute for Environment and Development (IIED)	Technical advice Management of funds of South-South collaboration
Centro Terra Viva	Facilitation Organisation of consultations with stakeholders
Bilateral agencies	
Embassy of Norway	Donor
Japanese Cooperation (JICA)	Donor
International organisations	
World Bank – Forest Carbon Partnership Facility	Potential donor
Center for International Forestry Research	Research
Private sector	
INDUFOR (Finnish consultants)	

**Figure 9. Structure of coordination of working group on REDD+ in the context of South-South cooperation**

Source: FAS (2009)

4.3.2 Process of consultation for the elaboration of the national strategy for REDD+

Beyond the First National Consultation on REDD+, organised in August 2010 with the aim of approving the action plan for the participatory elaboration of the National Strategy for REDD+ (EN-REDD), several meetings within the framework of the South-South cooperation were held around the country. The meetings involved government officials and representatives of civil society, private sector and especially local communities (Table 21 and Table 22). Men dominated these consultations. Considering that women have an important role in agricultural work, it is worth supporting greater participation by women in future meetings or consultations on REDD+.

Table 21. Consultations on the national strategy on REDD+ and training on forests and climate change

Location	Date	Men	Women	Total
Guijá	12/07/11	30	14	44
Mabalane	12/07/11	30	07	37
Chicualacuala	14/07/11	30	03	33
Inhambane	26/07/11	31	01	32
Chimoio	13/07/11	25	11	36
Moribane	14/07/11	47	13	60
Zomba	15/07/11	96	25	121
Gorongosa	18/07/11	26	07	33
Vunduzi	19/07/11	64	13	77
Derre	21/07/11	80	21	101
Mussoril	26/07/11	42	12	54
Mecuburi	27/07/11	39	11	50
Pebane	29/07/11	72	09	81
Pemba	27/07/11	29	07	36
Nova Madeira	29/07/11	74	20	94
Total		715	174	889

Source: Adapted from the CTV report on the consultation in the context of the South-South Cooperation Project

Table 22. Participants in the consultations and training events

Order	Type of meeting	Location	Type of participant
01	Consultation and dissemination of the national strategy for REDD+	Provincial capitals	Members of provincial governments (Direcção Provincial para a Coordenação da Acção Ambiental); technicians of the Forest and Wildlife Services, Environment, Tourism, Public Works and Transport; representatives of NGOs, the private sector (forestry and wildlife operators) and some academic institutions; district administrators, district directors; and some local journalists
02	Consultation and dissemination of the national strategy for REDD+	District headquarters	Members of district governments (district administrator, permanent secretary, district directors), technicians of Forests and Wildlife Services, extensionists, inspector, representatives of NGOs and the private sector (loggers and dealers), academic institutions, community leaders, members of the advisory councils, community radio journalists, heads of administrative units and members of community associations and committees on management of natural resources
03	Consultation and dissemination of the national strategy for REDD+	Communities and administrative units	Community members who use the forest as a source of energy or income (firewood and charcoal for their own consumption and for marketing), community leaders, heads of administrative units, members of committees on natural resources management where they exist, District Service for Economic Activities technicians working in the forest and environment sectors, loggers, members of associations of charcoal producers and other associations, technicians of NGOs working in the communities, representatives of forest companies, teachers and members of the advisory councils
04	Training on forests and climate change	Maputo, Xai-Xai, Chimoio, Quelimane and Nampula	Parliamentarians, academic institutions, the National Directorate of Forests and Wildlife, National Directorate of Environmental Management, state institutions (key sectors in deforestation and forest degradation at the national, provincial and district level, civil society representatives and community members in potential pilot areas

4.4 Policy options and future processes for REDD+

The documents of the proposed National Strategy on REDD+ dated March 2011 and the R-PP project submitted to the FCPF in January 2012 are the main sources of information on current ideas for the REDD+ project in Mozambique.

A key challenge for the proposed options is the risk of insufficient implementation and weak enforcement (Table 23). One of the major underlying causes of these institutional weaknesses is lack of goodwill more than lack of capacity.

Table 23. Key elements of the REDD+ proposal

Options	Proposals	Challenges	Opportunities
Type of REDD+	The activities to be covered by REDD+ include afforestation and conservation agriculture	Weak governance at the sub-national level may jeopardise implementation	There is a national strategy of reforestation that promotes the inclusion of afforestation in the REDD+ strategy
Funding	The current funding comes from the Norwegian and Finnish governments, with prospects of financing from the Forest Carbon Partnership Facility (FCPF)	Channeling funds to the field Little information on the costs of REDD+ Ability to raise funds for REDD+	A well-designed REDD+ strategy will have great potential to attract more funding
Measurement, reporting and verification (MRV)	Assessment of exploitation trends between 1972 and 1992	Capacity and limited data, baseline assessment challenged by the fact that deforestation prior to 1992 was affected by civil war (lower than it would be under normal circumstances)	The forest inventory 2004/05 and the agricultural census 2009/10 can be used as a baseline
Benefit sharing	Integrating REDD+ in the economic and social plans to encourage farmers to join.	Carbon rights versus rights to land and forests State-owned land and forests linked to the possibility of repeal of DUAT	Capitalise on lessons learned from the mechanism of distribution of 20% and exploitation rates and of 50% of revenue from fines, community consultations, and existing projects of forest carbon sequestration
Mechanisms of participation	Community consultations for the granting of land rights, as well as public consultations for environmental licensing, provide a good platform to ensure participation in decisions about REDD+	Transforming consultations in inclusive, transparent and effective processes of decision-making about the use of natural resources	The current review of the community consultation process is underway. The ongoing review of Forest and Wildlife Regulation
Policies and institutions	Need for greater institutional harmonisation and a framework that clarifies the mandates, reduces overlaps and contradictions and ensures coordination	Weak implementation of policies and legislation Lack of zoning and land-use plans Battles over control of funds Lack of continuity Coordination of multisectoral activities of REDD+ Independence of processes (political pressure) Weak political will Conflicts of interest (personal and public)	Institutional review of the land sector Agroecological zoning in progress

5 Implications for the effectiveness, efficiency and equity of REDD+

Based on the previous chapters, this final chapter focuses on a preliminary analysis of the effectiveness, efficiency and equity of REDD+, as well as implications of potential policies and measures. First, it examines national policies and policy options to address the causes of forest-cover change. Then it offers a more detailed evaluation of the relevant aspects of REDD.

5.1 National policies and political options

Effective results or effectiveness depends on the degree to which REDD policies are directed towards the real causes of change in forest carbon. In Mozambique, the main causes tend to originate outside the forest sector, particularly from agriculture (shifting cultivation) and energy (firewood and charcoal production), as well as from institutional deficiencies such as poor application of policies and laws and limitations on

human and technical capacity (see Chapter 1 and Table 24). Thus, it is not possible to imagine an effective implementation of REDD+ without the involvement of these sectors. The intensification of agriculture (through irrigation, improved seeds, weed control, control of pests and diseases, fertilisation, soil conservation and the spatial concentration of fields) and the expansion of alternative sources of energy, particularly in urban centres (to improve the availability and accessibility of electricity and natural gas), as well as the use of improved technologies (for the production and consumption of charcoal), represent important activities within the options of REDD+. However, to allow these policies to achieve the objectives of REDD+, it is essential that, in parallel, there are investments aimed at the underlying causes of land-use and forest-cover changes, particularly institutional weaknesses and poor enforcement of laws and regulations.

Table 24. Main causes of forest-cover change in Mozambique

Direct causes (often acting in combination)	Root causes
<ul style="list-style-type: none"> - Shifting cultivation - Subsistence farming - Permanent agriculture (expansion) - Woody fuel (charcoal) - Logging (especially illegal activities) - Infrastructure projects (e.g. mining) - Uncontrolled fires 	<ul style="list-style-type: none"> - Economic factors: high performance of export markets (cotton, tobacco, wood) - Production of food for own consumption (e.g. corn) - Demographic factors: growth of urban population and the associated demand for agricultural products and charcoal - Technological factors: low agricultural productivity, low production efficiency and use of vegetal charcoal and lack of viable alternative sources of energy - Institutional factors: low capacity, patronage, poor implementation of laws and regulations

The cost-effectiveness of results depends on:

1. the priority causes of change in forest carbon being identified and addressed to make REDD options more viable. Looking at the current proposals for REDD+ (presentations of R-PP, etc.), there is room in Mozambique to improve the targeting of policy options for REDD+.
2. the ability of the government to respond to demands of REDD+, particularly at the sub-national level, but also the capacity of civil society to act as watchdog of government and the capacity of the private sector to respond to the new measures of REDD+.
3. the strength of the institutional framework. Currently, as all land belongs to the state, property rights in Mozambique are incomplete: the right of exclusion and alienation of forest land are not given by law. Nevertheless, there are important early experiences with instruments for payment for environmental services (PES), such as the Project Nhambita Community Carbon Project, which has made payments for more than five years. PSA schemes are considered more effective than traditional policy instruments to inform the use of this type of instrument in the context of REDD+. Thus, it is worth analysing these experiences and drawing lessons for the design of REDD+, especially about implementing instruments of performance in a context of important institutional challenges.

Capacity building must be done seriously and extensively, which means allowing time to learn key REDD+ concept and issues. This is important to ensure that local and national institutions are strong enough to participate effectively in the design and implementation of REDD+, as well as to respond to emerging challenges (for example, to manage the growing to define carbon rights in the face of growing demand by REDD+ project developers). Capacity building may involve external support, but can also include internal learning in the country – for example, through greater collaboration among institutions in the form of working groups on specific topics of REDD+, or capacity building courses offered by specialists in REDD+ (including those allocated to ministries) offered to teams of other institutions.

The degree to which the results of REDD+ will be equitable and will generate co-benefits depends

largely on whether the processes are inclusive and under national ownership, whether those who bear the costs of REDD+ are also being compensated, and how rights over carbon and, more generally, over environmental services are defined.

First, Mozambique needs to maintain the process of building REDD+. To date, the process has been relatively inclusive, as demonstrated by a multi-institutional working group on REDD+ (in the centre of the national REDD+ over the past two years) for a significant level of consultation (with a range of stakeholders, including at sub-national levels) and an important level of existing national priority (with the active participation of various actors from Mozambique in the REDD+ process). All these aspects can still be examined in depth, especially a more active participation by other government institutions (including MINAG and other entities beyond DNTF, as well as Ministry of Tourism and Finance), civil society and sub-national actors in the process of REDD+.

Second, it must be clear that fair results do not refer only to ensuring benefits for local stakeholders, including local communities, but also to compensation for all parties that incur actual costs. Examples of the latter may include stakeholders whose livelihoods or jobs are being affected by REDD measures, such as those informally involved in the business of fuel wood (production and sale of vegetal charcoal, for example).

Third, the pre-institutional conditions for equitable outcomes of REDD+, due to the lack of property rights in Mozambique, as previously mentioned, including the degree to which local communities can benefit from REDD+, will depend on the definition of rights over carbon and other environmental services (e.g. hydrological services and biodiversity). One possibility would be to align these rights with the ‘the legal right to use and benefit from the forests’ or DUAF (see Chapter 2).

5.2 Considerations on the effectiveness, efficiency and equity of the main aspects of REDD+

Considerations on the “3E”-aspects of REDD+ are summarised in Table 25. In the broader institutional and governance context, our analysis

Table 25. Evaluation of the most important aspects of REDD+ for effectiveness, efficiency and equity

Main aspects of REDD+	Effectiveness (carbon)	Efficiency (costs)	Equity and co-benefits
General context and institutional governance	(+) Technically, the institutional and legislative context of relevant sectors supports REDD+ (-) Implementation challenges	(-) Weak institutions and governance are general characteristics of the country, especially at the provincial and district levels can considerably increase the transaction cost	(+) National policies with emphasis on pro-poor and agriculture development. (-) Weak enforcement of laws and regulations may jeopardise equity of results
Conditions of tenure, property rights	(+) Technically strong, legally (recognises customary rights), (-) DUATs are incomplete without right of exclusion. => Need to analyse what policy measures can be more effective under these conditions (e.g. PES instruments may not work well in this context)	(-) The current process of obtaining DUATs is very tedious and long (= high transaction cost); currently the process of issuing new DUAT has been suspended. => It will be important to establish simpler and faster procedures for the certification of DUATs for communities and individuals and to create a unified land registration	(-) Incomplete rights to use and benefit from the land and poor enforcement of laws and regulations (e.g. community consultations, 20% timber revenue sharing scheme) => It is important to clarify the contents of DUAT and the actual exercise of rights
Capacity for MRV	(+) There are some historical data (-) Capabilities for MRV are limited by the lack of availability of data on carbon, infrequent updates and limited technical capacity => Possibility of using data from the IPCC Tier 1 + connecting MRV design with the causes of deforestation and forest degradation	(-) Relevant data scattered in different ministries (agriculture, energy and mining) => Need to invest in the harmonisation of infrastructure database for MRV + training + spatial focus of efforts for MRV to increase cost effectiveness	(+) There are efforts to involve local communities in monitoring => Potential for communities to participate in MRV
Financing	(-) Currently no institutional architecture in place (+) Important lessons to be learned from existing experience with performance payments	(+) Opportunity cost of REDD+, especially small-scale agriculture is relatively low (Nhantumbo and Izidine 2009)	(+) Important lessons to be obtained from existing experience with performance payments to communities
Participation and vertical coordination	(-) Weak vertical coordination with provincial levels being independent of national level (+) Various efforts for decentralisation	(-) Dispute between the public and private (= high transaction cost) over the responsibility of implementing REDD+ => Clarify responsibilities and explore options for public-private partnerships	(+) Demands for participation of local communities and other stakeholders
Horizontal coordination	(-) Intersectoral coordination often indicated as the challenge in policy making in Mozambique	(-) Disputes over competences of the sectors may increase the difficulties of intra-sectoral coordination => high cost of transaction	

finds that, although technically the current relevant group of sectors supports REDD+, there are serious challenges in planning and implementation that can compromise its overall effectiveness. The weakness of institutions can be seen across all sectors, especially at the sub-national level, which can affect the cost-effectiveness of REDD and lead to considerable transaction costs. In terms of equity, national policy priorities include the objectives of pro-poor growth and agricultural development. These can contribute to poverty reduction, but again, actual results will depend on the degree to which these objectives will be implemented.

Regarding tenure rights, our analysis shows that according to Mozambican law, the land law (*de jure*) is very progressive. It recognises customary rights, but the rights to use and benefit from the land (DUATs) are incomplete. The state has ownership over natural resources, including environmental products and services. This can reduce the effectiveness of some REDD+ policies (for example, payments for environmental services since the right of exclusion is not guaranteed). Therefore, it requires an initial analysis of the potential implications of alternative measures of policies and, possibly, a reform or clarification of the systems of property rights.

Furthermore, with respect to cost effectiveness, the process of obtaining DUATs is very tedious and time-consuming (currently the emission of new DUATs is suspended until a new zoning is completed), resulting in high, even prohibitive, transaction costs. To increase the cost efficiency of REDD+, it will be important to implement a rural cadastre and adopt simpler and faster processes to obtain community and individual DUATs. Incomplete land-use rights and deficient enforcement of existing laws and policies affect the equity of outcomes. Examples of such policies include the requirements to receive a share of 20% revenue rate of logging; the requirements for sharing 50% of revenue from fines when local communities contribute to reporting any illegal activities; and agreements during community consultations. To improve the equity of outcomes for REDD+, it will be important to clarify processes (including the acquisition of DUATs and alignment of carbon rights with land and tree rights) and implement laws and policies.

Regarding measurement, reporting and verification (MRV), the situation in Mozambique suggests that some historical data on forest cover and forest-cover change exist, but the capabilities for MRV are limited by infrequent updates, lack of data on density biomass of carbon and emission factors, lack of spatial coverage and details, and limited technical capacity. To increase the effectiveness of REDD+, it will be necessary to start using the methodologies of the guide for good practices of the IPCC (Tier 1); simultaneously, it's vital to improve the capacity of MRV and link its design with the causes of forest-cover changes (at the sectoral and spatial levels). In terms of cost efficiency, the capacity for MRV is more affected by the lack of harmonised data. Moreover, information relevant to REDD is spread over different ministries (e.g. agriculture, energy and mining). To reduce transaction costs and allow more efficient planning of MRV, a database and harmonised deployment of an infrastructure focused on MRV are recommended; this should accompany MRV efforts targeting specific causes of forest-cover changes and their place of occurrence. The existing initiative already involves local communities in local application (and participation in 50% of the fines collected). Given that groundwork will be an important element of MRV in Mozambique (since the degradation is widespread – for example, through logging or firewood production), it is possible to foresee the inclusion of communities in MRV field activities (Skutsch *et al.* 2009).

Our analysis suggests there is currently no infrastructure funding specifically for REDD+, although there are plans to establish a national fund (see Chapter 4). To ensure cost effectiveness, the design and means of financial institutions could benefit from the experiences with the revenue-sharing initiative (the requirements to share 20% revenue of logging fees) and the payments for environmental services (PES) in the provinces of Sofala and Cabo Delgado. Regarding cost efficiency, a preliminary analysis suggests the opportunity costs of REDD in Mozambique are relatively low (Nhantumbo and Izidine 2009). To increase equity and co-benefits, Mozambique can learn a lot from existing experiences in the country with performance payments to local communities – the type paid for environmental services (PSA) – as done in the Sofala province for at least five years.

Our analysis suggests that vertical coordination and participation are still generally weak, although there are several efforts to decentralise sub-national governments at the provincial level. The provincial and district governments are gaining more power and are working more independently of the national authority. The planning process starts at the district level through the establishment of the District Development Plan, which guides the allocation of the district's operating budget. For purposes of REDD+, vertical coordination is essential and can be encouraged through an appropriate sharing of benefits among different administrative levels and stakeholders, which also would result in greater equity. Regarding the implementation of REDD+, cost efficiency is now challenged by some disputes about the responsibilities of public (government) and private

entities. To reduce transaction costs and improve cost efficiency, public-private partnerships can be explored.

Horizontal coordination is another key aspect for REDD+, especially due to strong cross-links. So far, intersectoral coordination is poor in practice, although plans and institutions do exist that supposed have a better intersectoral coordination (for example, CONDES). To improve cost effectiveness through the horizontal coordination of REDD+, it would be useful to analyse why CONDES has so far been ineffective. Subsequent reforms might allow greater participation of other ministries in the national process of REDD+. In addition to greater equity, it also has the potential to make REDD+ results more sustainable and successful.

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In 2009, the Center for International Forestry Research (CIFOR) began its Global Comparative Study on REDD+ in nine countries: Bolivia, Brazil, Peru, Cameroon, Democratic Republic of Congo, Tanzania, Indonesia, Nepal and Vietnam. A partial analysis has since been made in another three countries: Papua New Guinea, Mozambique and Burkina Faso. After analysing REDD+ national policies and emergent strategies, CIFOR researchers developed five working areas for each country. These areas include the country profile, media analysis, policy network analysis, political content analysis, and a fifth area of study, of specific policies, to be determined based on the results of emerging research.

This publication offers an overview of REDD+ strategy in Mozambique through a synthesis of the current knowledge about the causes of forest carbon changes, a review of the legal and institutional context, and a description of the current political process of REDD+. The objective of the study is to collate data and relevant information, and to offer a preliminary analysis of the fundamental aspects that can help promote efficiency, efficacy, and equity in REDD+ policy. Specifically, this study concludes that some of the major problems for REDD+ in Mozambique are the lack of data about deforestation and forest degradation, institutional weakness (regarding monitoring and propriety rights), and gaps in human and technical capacity to fulfil demands associated with REDD+. Therefore, efficient results will depend on the degree to which REDD+ policies are oriented toward real mitigation of the sources of forest carbon changes. In Mozambique, REDD+ policy tends to originate outside the forest sector. The cost-effectiveness of the results will depend on identifying and addressing the fundamental causes of forest carbon changes through more viable REDD+ policy options; government capacity to respond to REDD+ demands, especially at the sub-national level; the capacity of civil society and other institutions; and the strength of the institutional framework. The degree of success of equitable outcomes and the generation of co-benefits will depend on the inclusion and appropriateness of the processes at the national level; if those who support REDD+ costs are also being compensated; and on the general definition of carbon rights and environmental services.

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