

Forestry and Prospects for Stability, Livelihoods and Peace-building in the Equatorial States of South Sudan

An Initial Assessment

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June 2015

Part of the USAID Case Studies Series

“Conflict and Cooperation in the Equatorias”

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The objective of this collection of case studies is a deeper operational and scholarly understanding of developing dynamics in the Equatorias. We focus on economic life, culture, the management of diversity, histories of conflict and reconciliation, and relationships between residents of the Equatorias and civilian and military authorities. It is hoped that an understanding of how these factors affect citizens' access to services, their participation in political and development processes, and their own cost-benefit analysis of engaging in violent conflict is crucial for drafting effective programmatic approaches. These case studies are made possible by the support of the American People through the United States Agency for International Development (USAID). The contents of this case study are the sole responsibility of the author and do not necessarily reflect the views of USAID or the United States Government. Case studies are individually authored and reflect the research, argument and voice of each author.

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Acknowledgements

The candid responses of the key informants and participants of focus group discussions have made this report what it is. I would like to thank each of them for their kind assistance and hospitality in tolerating my questions. I would like to thank the entire VISTAS team at AECOM and USAID in South Sudan, without whose support this report would not have been possible. I would like to thank the team at ETC whose insight into the operation of a forest sector business was invaluable. I would like to thank the Government of the Republic of South Sudan, particularly the Director General of Forestry at the MAFCRD whose direction was critical to the report.

Executive Summary

The forest estate of South Sudan represents a key national asset for generating significant sources of revenue for the developing nation. As such its proper management is essential for promoting economic development, livelihoods and ultimately, mitigating conflict. Particularly in the Equatorias, the forestry sector has the potential to generate significant benefits for both communities and government institutions associated with its management. However, the opposite may also prove true if tensions in the sector are not addressed in an inclusive manner. In addition to presenting a current picture of the forestry sector, this report highlights three important areas of tension that could create future conflict. These are: the lack of a legal framework and regulatory clarity in the sector; the growing tension among local communities and “others” around land use and land use change; and existing tensions that are exacerbated by the projected impacts of climate change including increasing scarcity and the loss of ecosystem goods and services.

The information in the report was gathered using semi-structured interviews, field observations and a literature review. In addition to identifying potential areas of tension that may lead to conflict, this report also highlights areas of engagement that may provide some resolution to these tensions. Respondents identified both barriers to investment in the sector and wider threats to the forest estate and using a frequency analysis, I have proposed areas of intervention accordingly.

The results of this study show that in order for much needed investment in the sector to occur, both from external actors, and from the national government, clarity in the legal and regulatory frameworks for forestry must be established. Without this clarity, investor confidence will remain low and South Sudan will miss out on the benefits of a healthy forestry sector. Additionally, in order for the forestry sector to flourish, an extensive investment in physical infrastructure, technical capacity building, land use planning and climate change response strategies will be needed.

Building on the asset of the forest estate, the Equatorias have a key opportunity to solidify peace dividends for the future through a vibrant forestry sector. This can be accomplished by formalizing good practices in natural resource management, accompanied by a legal framework that provides clarity over rights, roles and responsibilities and revenues, and an explicit strategy for combatting external threats from climate change. Although more study is needed, it is predicted that the inherent stability that this type of investment can bring will likely provide a strong disincentive to conflict. After decades of conflict, the Equatorias have some respite from conflict. Representing a relatively peaceful part of the country, the choice of Equatorians not to return to open conflict as other areas of the country have, should be seen as an opportunity for investment, and should be supported wherever possible.

Acronyms

| | |
|--------|---|
| CES | Central Equatoria State |
| ETC | Equatoria Teak Company |
| FAO | Food and Agriculture Organization |
| GFW | Global Forest Watch |
| GOS | Government of Sudan |
| LGAF | Land Governance Assessment Framework |
| MAFCRD | Ministry of Agriculture, Forests, Cooperatives, and Rural Development |
| MAF | Ministry of Agriculture and Forestry (State level) |
| RLC | Rubena Lado Company |
| ROSS | Republic of South Sudan |
| SPLA | Sudan People's Liberation Army |
| SSP | South Sudan Pounds |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| USAID | United States Agency for International Development |
| UXO | Unexploded Ordinance |
| VISTAS | Viable Support to Transition and Stability |
| WES | Western Equatoria State |
| WRI | World Resources Institute |

Introduction

The role of that natural resources have and will play in the development of South Sudan is a critical one. Natural resources can create wealth and stability if managed and governed well. Alternatively, they can create endless power struggles, civil strife and violence if managed poorly (Renner, 2002).

Although the dominant narrative around natural resources and their management in South Sudan has been almost singularly focused on oil, forests and forest resources, are key assets, especially in the Equatorias. Their management and governance can be a key foundational asset to the people of South Sudan, or a perpetual flashpoint for conflict. Furthermore, unlike oil-based resources, forest resources can be renewable and offer a potentially long-term, net benefit to livelihoods options, economic diversification, stability and peace-building initiatives.

The objective of this study is to look at forests and forest resource management in the Equatorial states, and investigate the potential impact of the forestry sector on the dynamics of development and conflict in the Equatorias. In order to accomplish this we will need to investigate the context of forests in South Sudan, their usages and current dynamics of land use change. This will be accomplished by studying the current status of forests, trends in management, forest cover statistics, and social impacts of forestry in relation to livelihoods, and markets for forest resources. Through a series of key informant interviews and focus group discussions, we will highlight areas where conflict may arise. Finally, we will look at the potential interventions that could assist in helping the forest sector to deliver on peace-building efforts in light of contextual elements such as socioeconomic pressures, broader land use changes and climate change.



The information contained in this report was gathered through a combination of semi-structured interviews with key informants, field observations, and a review of primary and secondary source material in the literature. The primary sources included: (1) interviews with government officials at the central government of the Republic of South Sudan (ROSS), state, county and payam levels; (2) interviews with individuals and focus group discussions in communities involved in some form of forestry; and (3) interviews with key informants at companies involved in forest resource management. Secondary sources included a literature review of relevant reports on forestry in South Sudan's history, conflict dynamics, and climate change. Field visits were conducted in the month of April 2015 and the researcher visited Juba, Lainya and Yei River Counties, in CES and Yambio and Nzara Counties in WES.

1. What has your experience been with the forestry sector in the Equatorias?

2. What role do you see the forestry sector playing in the sustainable economic development of the region?
3. Are there barriers to investment in the sector? If so, what are they?
4. From your perspective, what are the main threats to the forest and forestry sector?

The answers to these questions guided the conversation with each expert and informed a more rounded picture of the forestry sector. For the purposes of this report, I have the responses to these questions across all of the key informants in order to highlight commonality when and where it existed, using a frequency analysis. Although, admittedly, a much more statistically robust method of data collection and analysis is needed to interrogate these perspectives thoroughly, for this initial assessment, themes of commonality were selected as a platform for which to begin a more substantive dialogue on the forestry sector.

Respondents and interviewees entered into congenial, open conversations and were not remunerated in any way. Although guiding questions were used, I actively tried not to direct the conversation in order to elicit the most unbiased results from the conversations.

The results of the key informant interviews are presented using a frequency analysis¹ where common themes were identified in each interview and aggregated with responses from other interviews. The results of focus group discussions are integrated into the of the forest uses and livelihoods information. Combined with field visits, I attempted to capture the insights of experts into the underlying state of the forestry sector and the role it plays in the lives of Equatorians.

Forestry in South Sudan

According to Gafaar (2011), the formal forestry sector was started in Kagelu, Yei River County, in 1919 where the British condominium planted the first teak (*Tectona grandis* and *T. grandifolia*) imported from South Asian colonies for a trial in southern Sudan. By the 1940's the commercial benefits of teak production were well established and the planting of teak, in large areas of the Equatorias and Bahr El Ghazal was encouraged as an economic mainstay. As an incentive, the condominium government demarcated large areas as gazetted, concessionary assignments to both parastatal and private sector entities to encourage development of the industry. In this regard, the economic reliance of then southern Sudan has involved forestry sector for far longer than on oil.

During the 1983-2005 period of conflict, both the GOS and the SPLA used the export of teak and other hardwoods to continue to fund their efforts during the

¹ A frequency analysis is a statistical method of highlighting the occurrences of common themes across multiple respondents. It aggregates the number of times key messages are mentioned in the responses.

conflict. African blackwood (*Dalbergia melanoxylon*), and mahogany (such as *Khaya senegalensis*), both from natural forests were largely exported northwards, whereas teak from plantation forests was exported southwards, largely reflective of where front lines lay at various periods of the conflict. During the years of war, formal forestry was not actively practiced at a large scale, save for extraction. This resulted in largely degraded state of the plantations with the higher-grade logs being felled without replanting, thinning, or other management treatments. Conversely, the remoteness of many areas of southern Sudan's natural forest estate, has led to many areas of the natural forest, remaining largely intact or substantially recovered since the withdrawal of active large-scale conflict in the Equatorias.

Although many areas of South Sudan are well wooded, the primary focus of this report is on the forests of the Equatorias. Ecologically, forests in the Equatorias fall in the category of *mixed deciduous fire-swept forest* as described by Smith (1949) which form a belt across the southern portion of the country and are further divided into zones dependent on rainfall and soil types. Although some remnant of Congo-basin forest (dominated by *Etandrophragma* sp.) exists in WES, as one moves eastwards the forest of the Equatorias are dominated by *Isobertina doka* and associated species. These forests represent the confluence of the more moist Congolese forests and the drier Doka woodland belt that stretches from West Africa through the Equatorias (Kingdon, 1989; Smith, 1949). The forests of the Equatorias are an important buffer against the advance of the more arid Sahelian landscape further to the north (UNEP, 2007). These forests experience a bi-modal precipitation pattern with between 800mm to 1500mm falling annually, mostly between April and July and again in November and December, increasing in volume as one moves westwards.

Forest cover statistics for the Equatorias are scant. UNEP (2007) claimed that 29 per cent of then-southern Sudan was forested at the time of the study, citing FAO data from 2005. Remote sensing efforts collected and analyzed by The Global Forest Watch (GFW) show a much higher coverage of forests, with as much as 52% of all South Sudan qualifying as forest². The GFW, a project of the World Resource Institute (WRI) analyzed remote sensing data over the period of 2000- 2013 and through this process estimated that southern Sudan's forest estate was roughly 33 million hectares as of the year 2000 but that South Sudan lost approximately 154,114 hectares by the end of 2013. This estimation is based on using the FAO default forest definition of at least 0.5 hectares area, 15 percent canopy cover, and at least 5m at maturity (FAO, 2006). Using either estimate, it is safe to say that a significant portion of the country is covered in forest.

²Global Forest Watch South Sudan Product using 15% canopy cover. <http://www.globalforestwatch.org/map/7/6.84/30.48/ALL/grayscale/loss,forestgain?begin=2001-01-01&end=2014-12-31&threshold=15>

The GFW estimate does not use state boundaries as a base layer and therefore the 'Equatorial region' is shown as the total of three States. With this in mind, the Equatorias are shown to have approximately 13 million hectares, equating to 68 per cent of the land cover in the three states being covered in forest and woodland. Western Equatoria's forest cover is by far the highest, while Eastern Equatoria's forest cover is the lowest, although reliable disaggregated data by state are not available at this time.

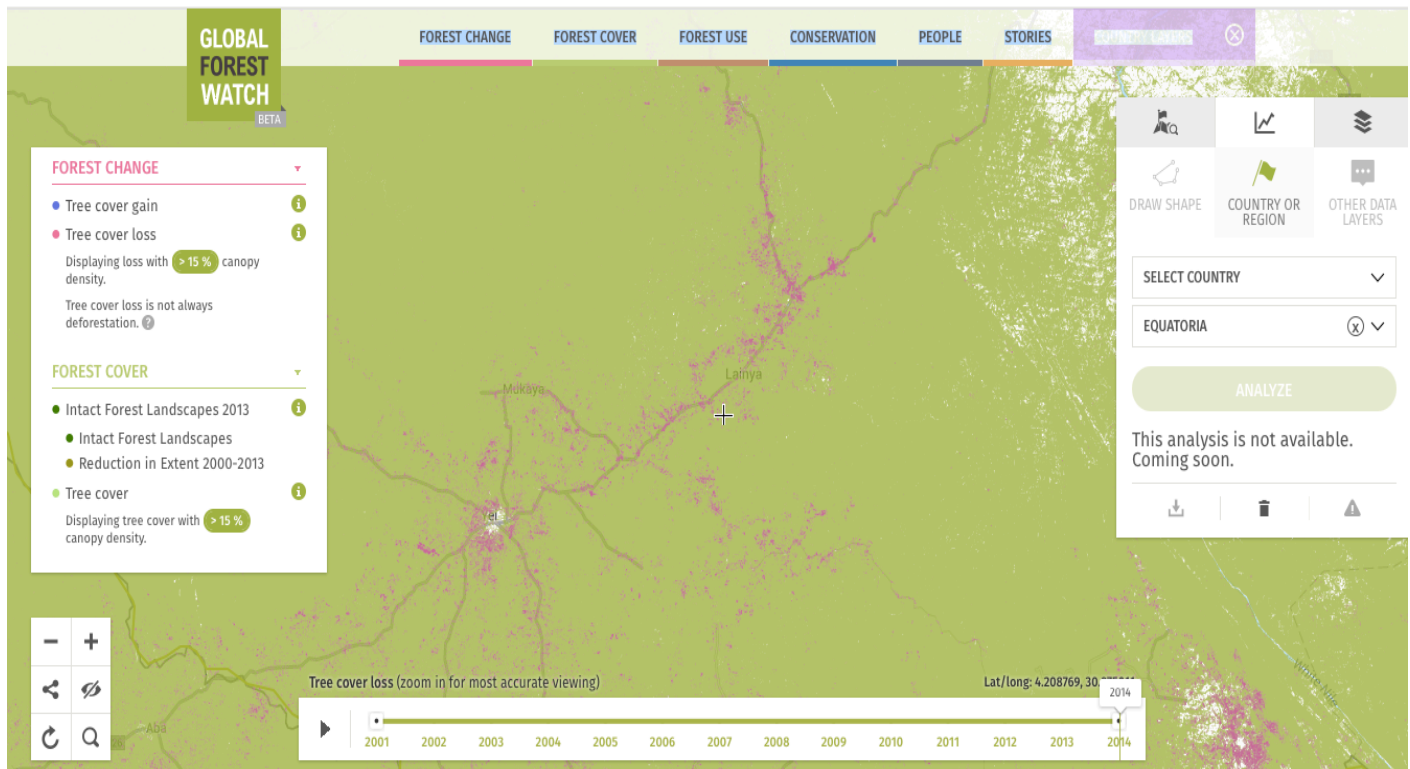


Figure 2: Map of forest change

Global Forest Watch product for southern areas of Central Equatoria State. Note the presence of heavy deforestation (pink pixels) along infrastructural lines (roads) especially around Yei and Lainya

Forests types

Broadly, forests types in South Sudan can be categorized as either natural forests or plantation forests.

Natural Forests: The natural forests of the Equatorias are characterized by a mixture of Congolese forest species (*Albizia sp.* and *Etandrophragma sp.*) and fire climax species such as *Acacia sp.*, *Azelia sp.*, *Anogeissus*, *Balanites aegyptica*, *Brachystegia sp.*, *Combretum sp.*, *Dalbergia melanoxylon*, *Isoberlina doka*, *Khaya senegalensis*, *Tamarindus indica*, *Sclerocarya birrea* and *Vitellaria paradoxa* etc. These forests have a high level of biodiversity and generate important ecosystem

goods and services including provisioning services, carbon sequestration, hydrological cycling, soil stabilization and cultural services. These natural forests form the vast majority of South Sudan's forest estate. These forests are located mainly on the Ironstone plateau of Central and Western Equatoria.

In addition to the forests west of the Nile, Eastern Equatoria has a significant forested area. Of primary importance is the forest in the Imatong mountains. As a gazetted forest reserve of 30,250 hectares, the forest block is relatively large and represents the only example of Afromontane forest system in South Sudan (Friis & Vollesen, 2005). These forests are a mixture of both natural and plantation blocks. The plantation forests have the potential to play a significant role in the economic development of the area and of the wider South Sudan if managed properly, which will be discussed in depth below. Perhaps more importantly, the Imatong forests are remarkable for both their high levels of endemism and the relatively intact status of the natural forest itself (Friis & Vollesen, 2005; Gorsevski et al., 2012). Although I was unable to visit the forests of the Imatong mountains during this assessment, their importance as a biodiversity hotspot has been highlighted as a conservation priority elsewhere (Friis & Vollesen, 2005; Gorsevski et al., 2012). The subsequent need for forest protection in the area should be highlighted as an important step in conserving the ecosystem goods and services of the area (Gorsevski et al., 2012).



Figure 3: Natural forest

The natural forest of South Sudan makes up the bulk of its forestry estate.

Plantations: In stark contrast to the high diversity of the natural forests, the plantation forests are dominated by a single non-indigenous species of teak (*Tectona grandis*), which was first introduced by the Condominium administration as early as 1919. Although other plantation species were also introduced such as *Cedrela toona*, *Cassia siamea* and *Eucalyptus sp.*, the major economic focus, both then and now, has been on commercial teak production. Currently, the spatial extent of concessionary teak forests in South Sudan is debatable. Deng (2014) found that respondents to his survey indicated that ‘official papers’ state that there are 30,250 hectares (302.5 km²) of plantation teak. However, Gafaar (2011) argued that remote sensing efforts thus far had only shown 7,460 ha (74.6 km²) of forest. During field interviews with key informants, I also queried the existence of such maps but was unable to obtain any map delineating forest gazettement boundaries or spatial extent. Deng in 2014 encountered the same challenge, demonstrating a possible dearth of this information.



Figure 4: Teak plantation at Mborizanga, WES

However, UNEP and partners embarked on a resource mapping exercise in 2013; its outcome should help to shed light on the current situation. With preliminary results from Lainya and Torit counties demonstrating community perceptions of forest

boundaries, this exercise could provide important information to support policy decisions

Forest Uses

In order to ascertain the current uses of forests, I conducted two focus group discussions with forest resource users at the local community level. These discussions revealed both the multiple domestic uses that forest resources play in the lives of Equatorians but also the role that formal employment in forestry can play in the livelihoods of respondents.

The current primary economic usage of forests is for the growth of timber. I visited several active teak plantations during the fieldwork including the Loka concession, granted to the Rubena Lado Company (RLC) in CES, and the concessions operated by the Equatorial Teak Company (ETC), based in Nzara in WES. Focus group discussions with local forest users in Lainya county and in Nzara county demonstrated the vital role that a healthy forestry industry can play in not only generating revenue for the varying levels of government, but in creating long lasting livelihoods options for the communities in the surrounding areas. For example, the ETC directly employs more than 190 people while the RLT employs a further 50 individuals. Respondents in the focus group discussions indicated that without the presence of these companies, they would have no income and would have to resort to less sustainable uses of the forest such as charcoal production.

Outside of commercial plantations, uses of natural forests in the Equatorias are generally similar to elsewhere in the region. Forest resources are used in building, especially timber and poles, and for providing food diversification options and food security in times of scarcity from species such as lulu (*V. paradoxa*), marula (*S. birrea*), tamarind (*T. indica*) and lalob (*B. aegyptica*). Medicinal uses of the forest are myriad, including several decoctions used to treat malarial symptoms and skin ailments. Additionally, cultural significance is imbued to certain trees in the forest, especially utilizing large forest trees to mark special events or community meetings. An additional, yet non-explicit use of forest in the region is the critical role that forests play in climate stabilization and other ecosystem goods and services.

Legal Context

Under British colonial rule, forest tenure arrangements were organized through Central Forest Reserves (CFRs), and Provincial Forest Reserves (PFRs). CFRs fell under the jurisdiction of the central government in Khartoum, whilst PFRs were managed by the provincial administration for generating revenue at the provincial level. The post-colonial GOS largely adopted this system. These reserves served both to conserve areas of pristine forest and to develop a nascent forest industry through plantations. The colonial administration had an active role in promulgating multiple types of plantation forests in both the CFRs and PFRs, all with the intent of

increasing revenue (teak) and for feeding the steamship boilers for trade along the Nile. Forest outside of CFRs and PFRs was nominally government owned land, but fell under the management jurisdiction of the local government and communities resident in the areas³

The current legal context in which the forestry sector is governed in South Sudan can be described as ambiguous in many aspects, and absent altogether in the majority of its implementation. I found multiple contrasting opinions from respondents in terms of forest ownership, rights to concession, revenues, and roles and responsibilities for enforcement. For example the right to concession areas of forest is claimed by both ROSS MAFCRD and the state MAFs. *De facto* arrangements at *boma*, *payam* and county level seem to take precedence over any centralized level of control. However, respondents were unable to cite single legal framework as the basis for these arrangements.

Generally speaking, the legal definitions regarding the tenure of forests are either vague or outdated and the current dispensation of management that results reflects *de facto* arrangements rather than *de jure* tenure regimes. By and large, PFRs are now considered State Forest Reserves (SFRs) but this is not legislated. The establishment of boundaries between CFRs, SFRs and community forests are not well documented in recent times. Ambiguity over the boundaries and status of forest reserves can create significant conflict over management responsibility, boundaries, the rights of communities, the payment of royalties etc. An example of this can be seen in the ongoing tensions between the Central Equatoria Teak Company, with a legal concession granted by the national level MAFCRD and the Rubena Lado Company, with a legal concession for the same forest, but with the CES government.

In order to examine the legal context, it is necessary to understand the larger context of natural resource governance in both its current dispensation and in previous iterations. Many aspects of the legal framework for natural resource governance in a country as young as South Sudan have yet to be established. Although important acts such as the Land Act (2009) have been passed, other critically important aspects of devolved governance, vertical and horizontal federalism, agriculture, oil, investment, infrastructure, land tenure and fiscal policy have taken precedence over governance of the forestry sector, leaving for all intents and purposes, a governance vacuum in the sector. A volume of work conducted by Deng (2014) for the Law Society of South Sudan has investigated the forestry sector's legal framework in line with other sectors and has found that, surprisingly, the forestry sector's *de facto* arrangements are more functionally developed than many other sectors. However, overall the report showed that there is significant need for investment in a legal framework to support decision-making and governance of forests and forest resources, including regulatory instruments and

³ Interview with Timothy Onak Thwol, Director General Forests, MAFCRD, May 2nd, 2015.

enforcement. Using the World Bank's Land Governance Assessment Framework (LGAF), Deng examined a wide array of indicators on land governance in South Sudan. Among the indicators assessed, LGAF FGI5 and FGI6 are particularly important in dealing with issues of clarity of land tenure, land governance and control of illegal activities specifically in the forestry sector (Table 1). Deng found that South Sudan scored particularly low in this sector (indicated by the bulk of indicators scoring in the C and D columns, orange and red, below) demonstrating a need for significant strengthening of the legal and regulatory framework.

Table 1: Land Governance Assessment Framework Scores for Forestry from Deng (2014)

| Forest Land Use, Tenure and Land Conversion | | | | | |
|---|----|---|--|--|--|
| 5 | i | Boundaries of the country's forest estate and the classification into various uses and ownership are clearly defined and demarcated | | | |
| 5 | ii | In rural areas, forest land use plans and changes in these plans are based on public input | | | |
| Controlling Illegal Logging and Other Forest Crimes | | | | | |
| 6 | i | Country's approach to controlling forest crimes, including illegal logging and corruption | | | |
| 6 | ii | Inter and intra agency efforts and multi-stakeholder collaboration to combat forest crimes, and awareness of judges and prosecutors | | | |

Forest Cover Changes

Deforestation

UNEP and FAO estimate that the country's forest cover is approximately 29% per cent (UNEP, 2007). Previous estimates of South Sudan's annual deforestation rate have been in the range of 0.77 per cent per annum (FAO, 2006) to more than 1.87 per cent (UNEP, 2007) but reliable baselines for the country of South Sudan are non-existent at this point. Previously FAO had estimated that between the years 1990 to 2000, Sudan lost 589,000 hectares (5,890 km²) of forest per year (FAO, 2006). Additionally, the UNEP (2007) environmental assessment of all of Sudan shows that the overall rate of deforestation between 2000-2005 increased by 8.4 per cent from FAO's estimate, to 0.84 per cent per annum. The UNEP team concluded this rate would likely increase in post-conflict environments, so that by the year roughly 2050, South Sudan could achieve complete deforestation, based

on a linear deforestation model. Even with ambiguity in the actual rates, however, it is safe to assume that based on patterns observed elsewhere such as DR Congo, and Brazil, namely urbanization and the opening up of roads and general movement, a corollary increase in deforestation is occurring (Barber et al., 2014). Anecdotal evidence, ancillary data and interviews with key informants also confirm that this is the case.

Using the WRI GFW tool, examining the remote sensing data only, it is clear to see that during the period from 2005 – 2013 the Equatorias lost 7465 hectares (74.65 km²) on average per year during the period. Although this number is relatively low as compared to other countries in the region such as DRC, it represents a significant upswing in deforestation and land use change since the end of the conflict. Moreover, forest degradation is not accounted for in these figures. Deforestation peaked at several intervals including the periods of 2006-2009 where deforestation reached roughly 9500-10,000 hectares (95-100km²) per year. It is important to note that this most recent estimate for the rate of deforestation in the Equatorias is based on remote sensing data only and ground-truthing is needed to verify these statistics. However, again, ancillary data and experience suggests that land use changes, and in particular forest degradation, from the practices such as high-grading, is difficult to detect from remote sensing exercises and it is likely that the actual deforestation rate is much higher.

Drivers of Deforestation and Land Use Change

Forest cover loss can be caused by many processes, and may be temporary or permanent depending on the land use. Drivers of forest cover change, similarly, may be limited in temporal and spatial extent and may consist of primary and secondary drivers. In the Equatorias, the primary drivers of forest cover change reported by respondents during the assessment were the production of timber, charcoal, agriculture and unmanaged fire. The secondary drivers could largely be aggregated as a lack of socioeconomic alternatives and capacity gaps particularly in education.

In Central Equatoria specifically, I witnessed large-scale extraction of timber from both concessionary teak and from natural forests, specifically mahogany from *Khaya sp.* Rural producers receive relatively small sums for sawn timber (Table 2) but prices may triple by the time the product reaches the market in urban areas. Survey respondents indicated that mahogany is preferable for building in places like Juba but that softwood alternatives such as *Cedrela toona* are also available. However, without demand, foresters are not targeting softwoods for market. Without a comprehensive legal framework it is difficult to assess whether or not these supplies qualify as 'legal'. However, the volume of extraction is substantial and largely driven by demand in urban centres like Juba. I noted that several major humanitarian NGOs are also relying heavily on mahogany and other timber from natural forests for their operations, exacerbating forest degradation in the rural areas, reportedly because the cost is low.



Figure 5: Mahogany stock

Mahogany is being used in the construction of latrines in disaster response by a major international organization.

| Forest Product | Timber plank (1"x12"x 2.5m lengths) | Rough Beam (2"x4"x4m lengths) | Timber plank 1"x6"x 4m Lengths | Charcoal (~50 kg sack) |
|---------------------------------------|-------------------------------------|-------------------------------|--------------------------------|------------------------|
| Price point in rural Yei River County | ≈ 40 SSP | ≈ 25 SSP | ≈ 40SSP | ≈ 40SSP |
| Price point in Juba | ≈ 140 SSP | ≈ 45 SSP | ≈ 80SSP | ≈ 75SSP |

Table 2: Market prices for sawn mahogany and charcoal

Collected for Yei River County and at Juba Market, April 2015.

Status of Current Teak Concessions

Teak makes up roughly 2-3 per cent of South Sudan's overall forest estate and yet has an extremely important role in generating revenue. With most mahogany resources being sold cheaply to an internal market, teak represents a key asset for generating revenue from exportation with rising global demand.

However, the development of a viable industry has been slow. The legal framework to support investment is ambiguous and tensions between state governments and

the ROSS are evident. Without a proper legal framework to support ownership and management rights, long term, sustainable investors in the sector are rare. Additionally, concessionaires with legally defensible agreements are having to compete with other parties that may loot, steal, and in several cases reported to the author, simply take over another previously assigned concession. Infrastructure also remains debilitating with exports only being possible during the dry season each year when roads are passable.

Compounding these challenges, as of March 2015, teak export was halted, reportedly in order to assess the legal arrangements between state and central governments. However, neither government officials nor operators were able to show any documentation or official communication that an actual ban was in place. Teak harvesting is still ongoing in concessions such as Loka in CES and at ETC concessions in Nzara, WES, but shipments and sales are theoretically illegal, leading producers having to stockpile products. This has caused the ETC in Nzara to have to temporarily lay off workers until the teak ban is lifted and shipments can resume.

In Loka, the concession is generally in a degraded state. The Rubena Lado Teak (RLT) Company has harvested 2384 round logs (197.3 cubic meters) during March 2015 according to their internal records. Additionally, many small-scale out-growers are engaged in clearing of natural forests for the expansion of teak plantations. The RLT claim that their concession agreement indicated that they must help at least 20 local farmers to plant 5ha of teak each in order to diversify sources of teak and promote livelihoods. However, even these farmers are theoretically unable to export teak at the time of this report due to the export ban.

Currently, replanting is not happening in any of the teak concessions of Central Equatoria that I visited. The practice of clear-felling has been the chosen method for extraction, after which round logs are carried to the mill in 3m and 2.5m lengths for processing. Although the company says it intends to replant in some areas, respondents from the RLT stated that they will not replant in sites that are clear-felled but rather, will clear new sites for planting teak including those of outgrowers. They intend to manage the coppiced stumps in the harvested areas. Sites that had been clear-felled had not been prepared for replanting and best practices such as site preparation, enrichment planting and the removal of branches and other offcuts, detritus etc., are largely non-existent in Central Equatoria, leading to an overall poor prospect of a long term sustainable forestry sector in CES, unless significant interventions are made.

However, it is important to note that there are exceptions to this. As presented in the case study below, the ETC operating in Nzara County, WES, has demonstrated that it is possible to implement best practices in forestry management in South Sudan. I visited several areas of the concession and noted that the practices described above, including re-planting are ongoing and successful.

A Case Study: The Equatorial Teak Company



Operating from Nzara County, WES, The Equatorial Teak Company is a key investor in the forestry sector in South Sudan. As one of the largest investors in the sector the company has invested more than \$15 million US in their operations to date. The ETC is owned by Maris Capital, a UK-based company, with offices in Juba.

At Nzara, the ETC run a 70,000 ha concession, granted to them by the national government in Juba for a period of 30 years. The concession has roughly 2,400 hectares of commercially viable teak of which they have harvested roughly 42 hectares over the last 15 months. Additionally, ETC has demonstrated their commitment to best practice in forestry through active management treatments in the concession, including site management, extraction preparation, removal of detritus, thinning and pruning. ETC have planted a further 124,769 teak seedlings (roughly 160ha) having cleared some of the remaining concession area for this purpose. The operation employs roughly 190 fulltime staff from the local area including sawmill operators, mechanics, office staff, foresters and many other skilled positions, representing the second largest employer in the state after the government.

The sawmill can optimally produce 40-50 m³ per day of sawn logs, planking and other highly valued products for export. Prior to the teak ban, the company was exporting roughly 750-800m³ per month, in 2014. For each cubic meter exported the concession agreement dictates that the ETC remits US-\$105 to local government institutions: US-\$80 to the WES Ministry of Agriculture and Forestry, US-\$20 to Nzara County, and US-\$5 to the social development fund, thus creating a substantial revenue source for local government.



Figures 6 and 7: ETC stockpiled teak, awaiting export

Beyond the creation of a substantial number of jobs, ETC has demonstrated the role that a vibrant forestry industry can play in South Sudan. In addition to their operations, they have also built the only functional secondary school in Nzara

County. Other corporate social responsibility emphases have included a comprehensive health package for their staff, an employment insurance scheme, a vegetable production centre for local HIV treatment facilities, and an active capacity building/skills transfer program.



Figure 8. Nzara Secondary School, constructed by ETC

Key Challenges

According to the management of the ETC operations, some of the key challenges facing the operation of sustainable forestry operations are the lack of enforcement and forest law/governance. The ETC estimates that roughly 200ha of prime timber has been stolen from the concession during their tenure due to illegal logging. Law enforcement and governance is weak and the opportunity costs for illegal logging are extremely low, creating an environment where looting is a serious threat to legitimate operators. Without a legal framework to deal with such issues, and as the basis for enforcement, creating disincentives and higher opportunity costs, this problem is likely to continue unabated, forcing legitimate businesses to bear further enforcement costs. Additionally, the lack of infrastructure in the region means that ETC can only export for a few months of the year, while the roads are passable by transport trucks.

Lastly, the ban on teak exports instituted in March 2015, has created a serious lack of cash flow for the operation, endangering the employment and livelihoods of the entire staff of the company. This is only likely to be resolved when a legal and regulatory framework is put in place at the national level, explicitly addressing rights, roles, responsibilities and revenue sharing.

The case study of the ETC operation demonstrates the tremendous potential of the forestry industry to create value and stability in the Equatorias. However, it also illustrates the immense challenges inherent in operating a reputable forestry concession in the country. Addressing these challenges will be key to ensuring that the benefits generated by the industry are sustained in the long run. Without addressing these challenges, it is likely that serious, ethically-minded investors like ETC will be discouraged from continuing to invest in the forestry sector of South Sudan.

The Current Status of Natural Forests

Timber and poles production: The spatial extent and relatively ecologically intact status of natural forests of the Equatorias represents one of the most important assets the country has, especially in light of climate change. However, based on field observation and the results of focus group discussions, these forests are under threat. Primarily this is coming from economic pressure to produce timber and poles for urban centres within South Sudan. Although the legality of timber harvesting, particularly from natural forests, needs further examination it is understood that this industry is growing exponentially each year. It is well known that the timber industry was utilized heavily during the previous conflict in order to finance the conflict (UNEP, 2007; Gafaar, 2011). This pattern is well documented in other conflicts as well (Barnett & Adger, 2007). While no direct observations were made regarding conflict arising directly from this trade, the concentration of power may be a precursor to other conflicts which are unknown at this time. While timber and fuelwood production are unlikely to be directly linked to causation of conflict in South Sudan, it may help to facilitate conflict as has been seen both during the 1983 – 2005 conflict and also in neighbouring countries such as DRC, by increasing the likelihood of exploitation by parties to the conflict, operating in a governance vacuum and contributing to the ability of those same parties to continue to fund conflict (Renner, 2002; UNEP, 2007).



Figure 9: Mahogany en route to Juba

The price will more than double from source to the market in Juba.

Charcoal: Large-scale charcoal production was evident throughout the area and respondents indicated that almost all of the charcoal was destined for Juba. Respondents estimated that more than 95 per cent of Juba residents use charcoal as their primary fuel source. Charcoal is sold at 40 SSP per 50kg sack at the roadside in rural CES, whereas prices in Juba are often 80 SSP or more for the same size sack or *gunia*. The economic incentive to serve Juba with biomass is apparent. Survey respondents also indicated that charcoal production was becoming a very popular way to generate income quickly, and that even rural consumption is growing, particularly in roadside shops at the village level. It is unknown how many tonnes of charcoal are sent to urban centres like Juba on a daily basis. However, the scale of production and transport witnessed during the assessment indicated that this number is significant and without regulation, could add substantially to deforestation trends, particularly as neighbouring countries such as Kenya and Uganda tighten restrictions on their own charcoal sources.



Figure 10: Charcoal en route to Juba

In Juba, charcoal will fetch double the price paid at roadside in the rural area.

Fires: Fires were cited by many of the respondents as a large scale threat to both the forest and more generally to food security through the loss of bee hives and with that honey production potential as well as honey as a food. Other wild food sources such as *laleb*, *tamarind*, *nabuk*, *marula* etc might also be diminished by fire. Additionally, key forest products such as building materials, roofing grass and cash crops such as *lulu* are routinely lost in fires according to the respondents. Key informants also indicated that these fires were part of a broader tension between population groups with different land uses.

From a forest loss perspective fires can cause severe damage depending on their frequency. Fires can also suppress the growth and regeneration potential of areas

that have been harvested for materials, even on a sustainable basis. Although most of the species observed in the natural forest are well adapted to fires (i.e. *Combretum*, *Erythrina* and *Vitellaria*) the frequency of fires is the primary variable of concern. According to key informant interviews, the frequency and intensity of fires have both increased in recent years. The probability that increasingly frequent and intense fires can alter the dynamics of ecosystem goods and services provided by forests is very high. Subsequently, this change of land use can create changes to the livelihoods strategies employed by communities that depend on these forest landscapes.

Discussion: Potential Areas of Conflict

During the assessment, several areas of potential conflict began to emerge. Although these areas are currently causing tensions at various levels, as of the time of this report, no violent conflict had been directly associated with these tensions. It is important to note that it is unlikely that forests and forest resources will be the sole cause of these conflicts, but rather in the event of a conflagration, forest resources may contribute to conflict in similar patterns as have been seen during the war (i.e. as a way of creating wealth and political clout) (Renner, 2002).

State vs. National

The recurring theme across all responses from key informants was the inherent lack of clarity on legal and regulatory issues in the forestry sector. This lack of a forestry legal framework is consistent with the findings of Deng (2014) in his report on land tenure and governance and highlights a major gap in the current legal/regulatory environment. This is considered a major barrier to investment in the sector, and the stabilizing impact of livelihoods creation associated with investment. Although at the time of this report, a Forest Policy sits with the council of ministers, any legal framework that is currently being used pre-dates the country of South Sudan. This Forest Policy is likely to provide guidance for subsequent legal and regulatory tools, but it will be essential that this policy is endorsed at all levels of government in the vertical federal system if it is to be effective. Key informants saw this as a major challenge, arguing that they believed that the central government has no authority at all over “a resource that belongs to our state” according to the CES Director General of Forests. The Director General of Forestry at the ROSS Ministry of Agriculture, Forestry, Cooperatives and Rural Development (MAFCRD) believes that states should have rights to state forest reserves, whilst central forest reserves should be the domain of the central authority (i.e. ROSS). Tensions over rights, roles, responsibilities, and revenues will likely continue to exist until a widely endorsed legal framework is implemented. This illustrates that potential conflicts in the forest

sector may actually be nested in a larger tension associated with conflict over vertical federalism (Deng 2014).

According to Martin Tobiololo, Director of the Kagelu Natural Resource Training Institute in Yei County, there is a severe need for both internal and external investment in the sector. “Forestry is our oil in the Equatorias. And yet, there is not investment from the [national] government in the sector?” However, with profound ambiguity over who controls the rights to concession land, there is little hope of soliciting external investment until this is resolved. A case in point is the Central Equatoria Teak Company, who despite having signed concession agreement over the Loka concession in Lainya county, have not been able to operationalize that investment because of competing claims from concessionaires granted by the state government for the same area.

The lack of a legal framework serves as an incentive for illegal logging and extraction-only oriented investors. Providing a legal framework that formalizes clear rights, responsibilities and benefit-sharing mechanisms will be a key to not only avoiding conflict, but also attracting investor confidence in the sector. In turn, investment in the sector could have a stabilizing impact as has been demonstrated elsewhere. However, efforts to provide this clarity, including mapping and delineation of resource user rights, must also take into account existing functional *de facto* arrangements in order to avoid conflict from further top down approaches as described by Schomerus and Allen (2010). A comprehensive regulatory and legal framework is essential to creating stability in the sector.

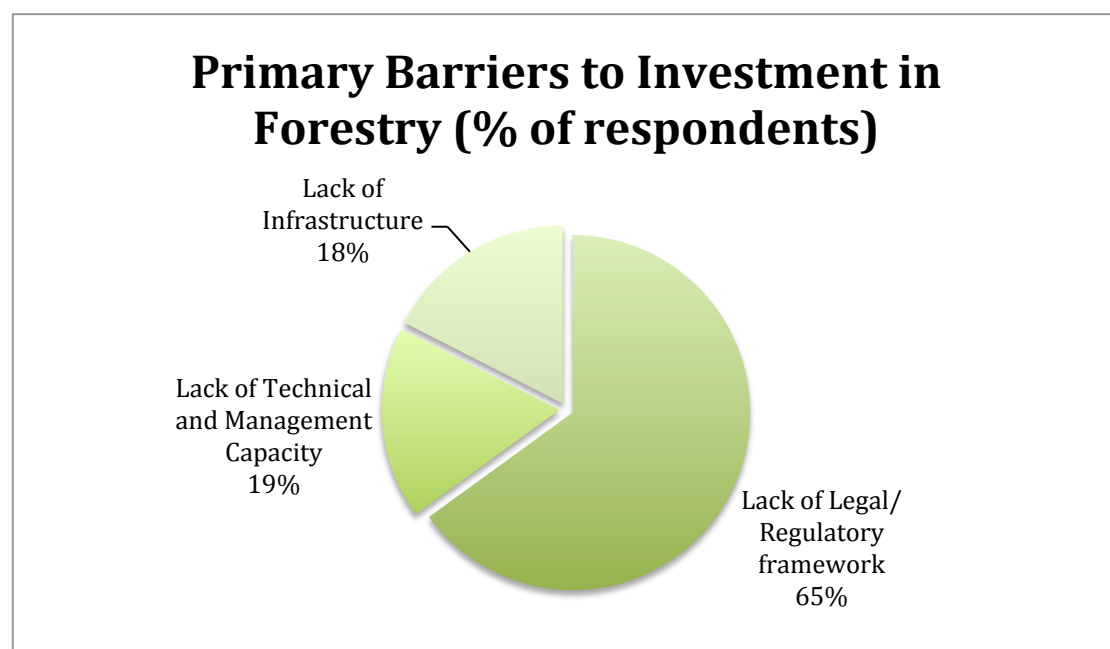


Figure 11: Primary barriers to investment.

This chart represents what respondents listed as what they considered the primary barrier to investment. Most respondents listed two or three barriers with significant overlap.

Local versus “Others”

Multiple respondents in the key informant interviews mentioned that there was a risk of violent conflict between local resource users and “others”, notably those from outside their local area or tribal affiliation. This is a well-documented source of conflict in the Equatorias and has roots reaching back several decades (Schomerus, 2008). In this case, conflicts that either impact or are impacted by forestry may be nested in larger land use and land use change conflicts (UNEP, 2007; Schomerus & Allen, 2010) and may be associated with systematic outflow of natural resources such as charcoal, timber (UNEP, 2007; Maystadt et al., 2014) and the increasing frequency of fires.

Across multiple key informant interviews, another major concern was the ongoing degradation of natural forests. Specifically, the ‘illegal’ clearance of biomass for timber and charcoal was cited as a potential flashpoint by a significant number of respondents (See Figure 12). Although local communities are undoubtedly benefitting economically in the short term, degradation of the natural forest estate is evident from field observations and sometime perpetrated by “others”. As mentioned above, degradation is difficult to measure from remote sensing efforts, but anecdotal evidence suggests that major extraction of both timber and charcoal is occurring in order to feed urban markets, primarily in Juba (Figures 9 and 10). This has been noted as a key driver of change in bothainya and Yei River counties, both areas serving urban centres of Juba and Yei respectively.

Interestingly, recurrent fires to open up grazing land were frequently cited as a potential source of outright conflict. “These fires destroy our trees that we depend on for food during the dry season and they destroy our hives which we get honey from” said one key informant. Respondents reiterated the role that fires play in disrupting livelihoods and impacting the growth of forests, and repeatedly referred to the fact that fires were almost always caused by “others from outside”.

Land use change due to movements of people and animals, forest loss and biomass clearance has been associated with conflict in other areas of the greater Sudan such as Darfur (Alix-Garcia et al., 2013). In each of these cases a clear delineation between the use of resources by “others” (i.e. not local) was noted (Alix-Garcia et al., 2014). In the Equatorias, outside of the commercial plantations, the primary clearance for land is agricultural, but increasingly new land is being cleared during the production of charcoal and natural forests are undergoing degradation to feed urban areas with mahogany and other hardwoods. Although operating in a “pseudo-legal” fashion, the extent of these resource flows is largely unknown. After

clearance, many of these areas also lead to better grazing and respondents indicated that this has encouraged transhumant pastoralists to utilize these areas in a pattern of in-migration. The change in land uses can create tensions between traditional land users and external parties wishing to utilize land for a different purpose. This can be linked to the ongoing tensions around transhumant pastoralists in the Equatorias as described by Schomerus (2008). The potential for conflict over land use change is real, although the intensity and spatial extent of potential conflict of this nature may be more limited. It may mirror previous tensions such as those experienced in 2005-2006, where local Moru agriculturalists clashed violently with Dinka transhumant pastoralists moving southwards with large numbers of livestock, or it may prove larger in extent.

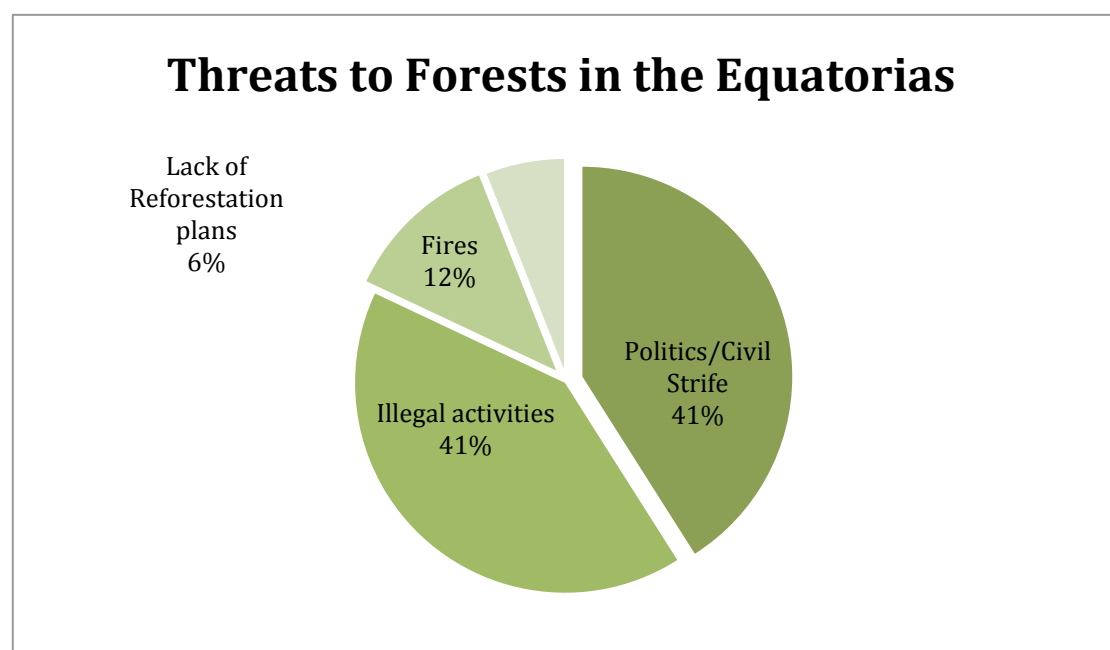


Figure 12: Threats to forest in the Equatorias

Politics and civil strife included civil war, tensions between state, local and national governments, timber bans and political wrangling. These represent only the primary concerns raised. Secondary concerns included climate change.

Climate Change

Climate change presents a new suite of challenges for the forestry sector's potential to create economic stability and ongoing peace. According the Millennium Ecosystem Assessment (2005), climate change will impact sub-Saharan Africa more intensely than most other areas of the world. Globally, the loss of forests account for 17-20 percent of total GHG emissions (IPCC, 2007) outpacing the transport sector, and adding substantially to the impacts of climate change on resilience strategies. The loss of forests presents an exponential negative in terms of climate change as

one loses both the ability to sequester carbon and clearance creates a large contribution to GHG emissions. Disaggregated data for South Sudan, and specifically for the Equatorias, are not currently available, but it is likely that the impacts of climate change on resource availability and scarcity will have negative impacts on stability, productivity and resilience (Maystadt et al., 2014; UNEP, 2007). Although there is still some debate regarding the linear causality of climate change and direct conflict, UNEP argues "...competition over declining natural resource was one of the underlying causes of the [previous] conflict." (UNEP, 2007, pg 70). Additionally Maystadt et al., (2014) found that "...competition over diffuse resources is more likely to be affected by the increased scarcity induced by weather shocks".

Key informants identified climate change as a potential threat to the forests. Maystadt et al., (2014) studied the links between temperature variation and the likelihood of conflict in South Sudan and found that one standard deviation of temperature increased the likelihood of conflict by as much as 32 per cent in South Sudan. Historically, there is a precedent for this type of conflict. Between 1997 and 2009, 26 per cent of violent conflict episodes in greater Sudan can be attributed to warming temperatures associated with climate change (Maystadt et al., 2014). The role that forests play climate regulation, is well understood and equally, the loss of forest cover also has been correlated with global rising temperatures (Jackson et al., 2008; Bonan, 2008). For example, in other countries in the region, conflict has been directly correlated with the loss of forest and increasing scarcity of resources inherent in climate change models for sub-Saharan Africa (Glew et al., 2010; Barnett & Adger, 2007).

South Sudan's principle asset in mitigating climate change is its forest estate, specifically in the Equatorias. Thus the importance of sustainably managing South Sudan's forest with a long-term outlook, including conservation and sustainable forest management, is of paramount importance.

Mitigating climate change through management of forest resources does not necessarily mean that forests cannot be utilized for development and generate revenue. Mechanisms such as Reducing Emissions from Deforestation, Degradation⁴, (REDD+) offer incentives to countries to maintain forests as key emissions sinks, including sustainable forest management. South Sudan is a new member of the UN-REDD Programme and support for activities has been committed. Successful examples of the implementation of project-scale REDD+ in

⁴ REDD+: Reducing Emissions from Deforestation, Degradation, plus with sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks is a climate change mitigation action that is becoming more popular as a potential tool for combatting negative impacts associated with forest loss under climate change scenarios. In its current iterations REDD+ includes a series of *ex-post* incentives that enable developing countries to continue to develop economically whilst not having to leverage their forests directly to do so. In 2014, South Sudan joined the UN-REDD Programme, a pathway towards establishing a national REDD+ programme.

the region are already seeing results and this presents a very viable economic substitute to the current low value extraction-based scenario in the natural forest of the Equatorias (Bernard et al, 2014). The essential role of the government in leading the type of comprehensive strategy needed to facilitate this cannot be understated (Barnett & Adger, 2007) and may be the key challenge in mitigating the negative impacts of climate change on the conflict in the South Sudan.

Gap Analysis

Based on the results of this assessment, I have noted a number of gaps in the current forestry sector. In order to avoid exacerbating tensions in the sector, it is assumed that addressing these gaps could avoid future conflicts involving forests and forest-based resources in the Equatorias. The ultimate goal in this is to enhance opportunities for utilizing the forestry sector as a foundation for economic stability, livelihoods creation and peace-building initiatives including the establishment of conservation oriented activities (Barber et al., 2014; Glew et al., 2010).

The gaps identified are as follows:

1. The lack of a comprehensive legal framework at the national level has resulted in tensions at the national, state, county, payam and boma levels particularly over rights, roles and responsibilities and revenues (benefit-sharing). Additionally, the lack of regulatory clarity, which could come as a natural product of a comprehensive clarification of legal arrangements, has meant that *de facto* arrangements have been utilized to govern the use of forest resources. Many of these *de facto* arrangements are functional and may be worth integrating into a national framework. However, without a legal framework, the lack of clarity in regulations could cause competing claims, loss of productivity and even conflict.
2. The lack of investment in the sector, from both national government and external investors is a key gap. This gap is complicated by a lack of investor confidence in the sector due to the legal ambiguity mentioned above. However, an investment in infrastructure such as roads, electricity etc., coupled with an investment in institutions and capacity in the sector, could deliver significant benefits in stabilizing the sector, and creating livelihoods.
3. A third key gap is the lack of a long-term strategy for addressing the challenges that will be associated with climate change in South Sudan. The links between forest land use change, warming, and conflict over resources are well established (Burke et al., 2009; Maystadt et al., 2014). Although integrating climate change considerations is a challenge that most countries in the world are only beginning to tackle, South Sudan's unique vulnerabilities, coupled with its high level of natural forest coverage, create an environment of opportunity to enact broad-reaching climate change mitigation programming. Integrating climate change strategies into ongoing programming is also an important opportunity for building resilience to shocks such as droughts.

4. Lastly, there is a significant knowledge gap on the state of forests and forests resources at a national level in South Sudan. Although some agencies are attempting to fill this void (i.e. UNEP) the lack of key documents and institutions such as a Forest Resources Assessment (FRA), a natural resources audits, and land use plans creates a significant dearth of pertinent information on trends, analyses etc. These elements are critical decision support tools for implementing programmes in the sector and their establishment, as a baseline with which to measure interventions against, should be a priority.

Recommendations

This assessment included input from multiple key informants and experts in forestry in South Sudan. Additionally, it has included the observations and information gleaned from focus group discussions, literature review, a gap analysis and field visits. Based on this I have made the following observations about programming emphases that may provide a way forward to avoid conflict. These recommendations are also presented below in matrix form.

Focus on programming objectives that will enhance the investment environment for the forestry and natural resource management sectors.

Importantly, active support to the design and implementation of a legislative framework and associated regulatory tools is a critical foundation for this initiative.

Examples of this type of intervention may include the direct investment in infrastructure projects such as roads, improvements in access to markets for teak producers, the establishment of value added processing capacity for hardwoods including furniture production, insurance packages that decrease risk for investors etc.

Integrate with programming that will guide land use change in positive ways.

Examples of this type of programming may include assistance to agencies implementing comprehensive land use management, mapping and land use planning, zonation, codification of de facto revenue and benefit-sharing arrangements, etc. as well as direct support to gap-filling in forest information such as Forest Resource Assessments, a natural resources audit at each state level, and the national forest monitoring system. Additionally, actively halting the use of hardwoods by USAID implementing partners could decrease the marketability of the products known to have a degradative impact on forests.

Integrate with programming objectives that will enhance resilience to climate change impacts.

Examples of programming that may be included in this goal are to work in conjunction with agencies such as the MAFCRD, UNEP, FAO and UNDP in the development of a national climate change response strategy, the establishment of a functional REDD+ programme at the national level and the associated support needed to make this a reality.

If programming is designed around accomplishing these three objectives, I believe it can help deliver stability in the forestry sector and in natural resource management more generally. In turn, that stability can create a culture of inherent value to forests and land in general, that with proper management can be a key in mitigating a return to violent conflict. Although extensive further study is needed, hypothetically the opposite may also be true; the absence of investment in forests may lead to increasing vulnerability, competition of scarce resources, a continued trend towards deforestation and degradation, ultimately leading to the lack of resilience to impacts of climate change. This situation could exacerbate tensions and lead to open conflict over land use change.

Conclusion

The forest estate of South Sudan represents a key national asset for generating significant sources of revenue for the developing nation. As such, its proper management is essential for promoting economic development, livelihoods and ultimately, avoiding potential conflict. Particularly in the Equatorias, the forestry sector has the potential to generate significant benefits for both communities and government institutions associated with its management. However, in order for this to happen there is a distinct need for a legal and regulatory framework that provides clarity on rights, roles, responsibilities, and revenue sharing in the sector. Without this clarity, investor confidence in the sector, will remain low and South Sudan will miss out on the benefits of a healthy forestry sector. Additionally, in order for the sector to flourish there is a distinct need for investment in the infrastructure to support the industry, including roads, electricity and institutional and technical capacity building. These interventions will need to explicitly acknowledge the challenges that will be inherent with climate change and plan for the associated impacts on land use and land use change.

After decades of conflict in South Sudan, the Equatorias represent a relatively peaceful part of the country. The choice of Equatorians not to return to open conflict as other areas of the country have, should be seen as an opportunity for demonstrating the dividends of peace and stability, and should be supported wherever possible. Building on the key asset of the forest estate, the Equatorias have an opportunity leverage economic diversification options through a vibrant forestry sector. This can be accomplished by formalizing good practices in natural resource management, accompanied by a legal framework that provides clarity over rights, responsibilities and revenues, and an explicit strategy for combatting external threats from climate change.

| Recommendations | | | | |
|--|--|------------|-------------|-----------|
| Objective | Possible Actions | Short term | Medium Term | Long Term |
| Programming that will enhance the investment environment | Improve infrastructure for investment especially roads | | | |
| | Design some more security for investors such as through more robust insurances, commitments to consultation before bans etc. | | | |
| | Establish a comprehensive legal framework for forest and forest resource management ensuring harmonization with regulatory clarity | | | |
| Programming that will guide land use change in positive ways | | | | |
| | Put a moratorium on USAID implementing partners using untraceable hardwoods | | | |
| | Fill gaps such as a comprehensive Forest Resource Assessment, and national forest monitoring system | | | |

| | | | | |
|---|---|--|--|--|
| | Based on gap-filling, initiate a comprehensive and inclusive land use planning component, including designation of further areas for reforestation and conservation | | | |
| | Establish a capacity building component for the forestry sector including in natural resource management, governance, mapping, planning, and forest law enforcement | | | |
| | Begin to actively integrate forestry (and broader natural resource management) components into all programming | | | |
| | Codification of functional <i>de facto</i> benefit-sharing arrangements (in order to inform with development of comprehensive legal framework) | | | |
| Programming that will enhance resilience to climate change impacts | | | | |
| | Support mitigation activities including REDD+ | | | |
| | Integrated mitigation and adaptation activities | | | |
| | Support the establishment of a national climate change response strategy | | | |

| | | | |
|--|---|--|--|
| | Support the establishment of a REDD+ national program | | |
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Works Cited

- Alix-Garcia, J., Bartlett, A., and Saah, D. (2013). The landscape of conflict: IDPs, aid and land-use change in Darfur. *Journal of Economic Geography*, 13(4), 589-617. DOI: 10.1093/jeg/lbs044
- Barber, C., Cochrane, M., Souza Jr., C., and Laurence, W. (2014). Roads, deforestation, and the mitigating effect of protected areas in the Amazon. *Biological Conservation*, 177, 203–209. DOI: 10.1016/j.biocon.2014.07.004
- Barnett, J., and Adger, W.N. (2007). Climate change, human security and violent conflict. *Political Geography*, 26(2007), 639-655. DOI:10.1016/j.polgeo.2007.03.003
- Bernard, F., Minang, P., Adkins, B. and Freund, J. (2014). REDD+ projects and national level readiness processes: a case study from Kenya, *Climate Policy*. DOI:10.1080/14693062.2014.905440
- Burke, M., Miguel, E., Satyanath, S., Dyekema, J., and Lobell, D. (2009). Warming increases risk of civil war in Africa. *Proceedings of the National Academy of Sciences*, 106 (49) 20671. DOI: 10.1073/pnas.0907998106
- Deng, D. (2014). South Sudan Country Report: Findings of the Landscape Governance Assessment Framework (LGAF). *South Sudan Law Society*.
- Food and Agriculture Organization (2006). Global resources assessment 2005: Estimating forest cover and forest cover change in Sudan. *Forest Resources Assessment Programme*. Working Paper 109/E. Rome, 2006.
- Friis, I. and Vollesen, K. (2005). Flora of the Sudan – Uganda border area east of the Nile. *Royal Danish Academy of Sciences and Letters*, Copenhagen.
- Gafaar, A. (2011). Forest plantations and woodlots in Sudan. *African Forum on Forests Working Paper Series*, Volume 1, Issue 15.
- Glew, L., Hudson, M.D., and Osborne, P. (2010). *Evaluating the effectiveness of community-based conservation in northern Kenya*. The Nature Conservancy. Retrieved from <http://www.nature.org/science-in-action/science-features/7-evaluation-kenya-pdf.pdf>
- Gorsevski, V., Kasischke, E. Dempewolf, J., Loboda, T. and Grossman, F. (2012) Analysis of the impacts of armed conflict on the eastern Afromontane forest region on the South Sudan – Uganda border using multitemporal Landsat imagery. *Remote Sensing of Environment* 118(2012), 10-20. doi:10.1016/j.rse.2011.10.023
- Intergovernmental Panel on Climate Change (2007). Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Retrieved from https://www.ipcc.ch/publications_and_data/ar4/wg3/en/contents.html

Jackson, R.B., Randerson, J. Canadell, J., Anderson, R., Avissar, R. Baldocchi, D., Bonan, G., Caldeira, K., Diffenbaugh, N., Field, C., Hungate, B., Jobbágy, E., Kueppers, L., Noretto M., and Pataki D. (2008). Protecting climate with forests.

Environmental Research Letters, 3 044006. DOI:10.1088/1748-9326/3/4/044006

Kingdon, J. (1989). *Island Africa: The Evolution of Africa's Rare Animals and Plants*. Princeton University Press. Princeton, NJ, USA.

Maystadt, J-F., Calderone, M. and You, L. (2014). Local warming and violent conflict in North and South Sudan. *Journal of Economic Geography*, 1–23. DOI:10.1093/jeg/lbu033

Millennium Ecosystem Assessment (2005). Overall synthesis report. Retrieved from <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>

Renner, M. (2002). The anatomy of resource wars. Worldwatch Paper 162. Retrieved from <http://www.worldwatch.org/system/files/EWP162.pdf>

Schomerus, M. (2008). Violent legacies: Insecurity in Sudan's Central and Eastern Equatoria. Small Arms Survey, Graduate Institute of International Studies, Geneva.

Schomerus, M. and Allen, T. (2010). Southern Sudan at odds with itself: dynamics of conflict and predicaments of peace. London School of Economics, Development Studies Institute, London, U.K.

Smith, J. (1949). Distribution of Tree Species in the Sudan in Relation to Rainfall and Soil Texture. *Ministry of Agriculture*, Khartoum, Bulletin No. 4.

United Nations Environment Programme (2007). Sudan post-conflict environmental assessment. UNEP Press, Nairobi, 2007.

United Nations Environment Programme (2013). Forest cover mapping in Ifwoto and Lainya Payams: Technical report. *South Sudan Pilot Community Forestry Project*. UNEP, DFID, MARCRD and NPA, 2013.

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