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POLICY BRIEF

Using & restoring the Miombo woodlands: needs for an integrated and holistic approach in ecosystem management for long term sustainability

Policy decisions made now about how to develop the Miombo region of Africa will have far-reaching consequences for the people living in this region and for the globe. There are currently conflicting viewpoints about the best way to ensure development goals and human livelihoods in the region, while also fulfilling conservation ideals and sequestering carbon. These decisions need to be grounded on solid understanding of the socio-ecology of the system, sound scientific information on the rates and causes of land cover change, and they need to include key-players at all levels of governance - from local, to national, to global.

The Miombo Network (MN) is an alliance of scientists that aims to achieve effective and appropriate management policies and practices by providing science-based information through the use of field-based approaches, remote sensing and other geospatial information technology, as well as the valorization of traditional-knowledge systems and new biotechnologies. This policy brief is the outcome of a meeting held in July 2016, in Maputo under the theme “Restoring socio-ecological and socio-economic relationships in the Miombo woodlands”.

Here we analyse how socio-ecological relationships are affected by the current state of Miombo ecosystem as well as options for restoration.

Socio-ecological relationships in Miombo woodlands

Miombo Woodlands are the *Julbernardia/Brachystegia* dominated woodlands that span 2.7 million km² across eight countries in southern and eastern Africa: Democratic Republic of Congo, Angola, Zambia, Zimbabwe, Malawi, Tanzania, Mozambique and partly South Africa (Figure 1). They are characterized by highly variable woody canopy cover –from 40-80% (Frost 1996). The ecosystem has high plant species diversity and endemism, and a rich avifauna, containing several global hotspots of biodiversity: the grassland/woodlands mosaics NW and NE Zambia (Mwinilunga, Mporokoso) are just a few.

76% of the energy used in the region is derived from the woodlands (Ryan et al., 2016); timber products are exported; food from bushmeat (Fa, 2015), caterpillars (Chama, 2016), honey (Ribeiro et al., 2016), roots, and leaves are a key source of nutrition and income – especially during the dry season and also in times of crop failure. Forest products are used and traded extensively for medicine, curios and ornaments (Brigham et al., 1996). More recently the carbon storage potential has become a likely source of income and an opportunity to restore over-utilised woodlands with the initiation of REDD+.

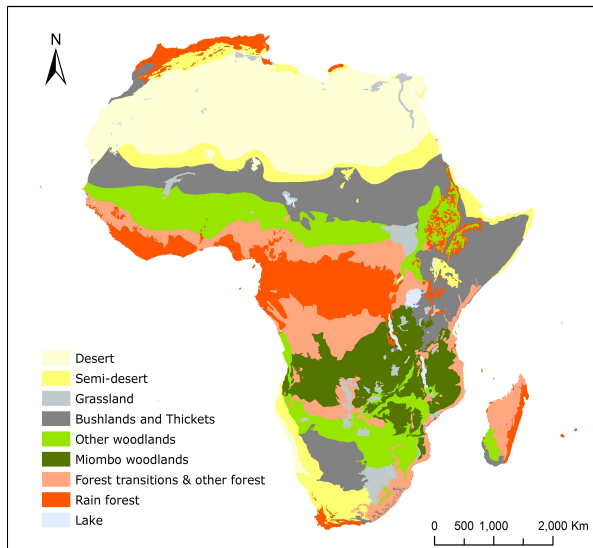


Figure 1. Map of African Vegetation, showing Miombo woodlands in dark green (Source: White, 1983).

Fire is a cultural management tool, which has been (and is being) used by most rural communities in the Miombo region. It is also a key ecological factor in maintaining Miombo ecology. However, changes in fire regimes derived from among others, human population growth and climate changes, may impact on the ecology of Miombo and thus, the resources provided by the ecosystem. The dimension of these changes is still less known in the region.

At the global level, Miombo represents an important carbon repository and a potential source of both renewable energy (via sustainable charcoal industry) and carbon storage (through increasing above-ground biomass). Up to 80% of the population in the region – both rural and urban - benefit from goods and services from Miombo woodlands (Malimbwi et al., 2010).

“Resource use of Miombo woodlands has not enabled the rural masses to come out of poverty.”

Causes of forest degradation and deforestation

This region is also highlighted as a potential area for expansion of agriculture in the next century. Conversion of Miombo for agriculture, forestry, and mining is

increasing, and in order to fulfill Africa’s agricultural development goals this will have to accelerate. Concurrently, the intact natural Miombo woodlands are under increasing pressure to provide all the resources mentioned above – not only to the rural population, but also to the ever-increasing urban population via trade and businesses. This may result in degradation of the woodlands and deforestation, which in turn reduces the resources that may be extracted. We estimate that between 250,000 and 300,000 ha/year of Miombo are degraded and/or lost (Miombo Network Meeting, July 2016).

Fact Figures about Miombo resources

- Timber industry in Mozambique was worth \$330.3 million in 2011 (UT-REDD, 2016).
- 14.8 million m³ wood used in Mozambique for biomass energy (Siteo et al., 2010).
- Medicinal or therapeutic plants and products in Southern Africa are estimated to yield US\$ 150 million/year although some of the harvesting methods are unsustainable (Syampungani et al., 2009).
- Provisioning services (including NTFPs) contribute \$9±2 billion/year to rural livelihoods (Ryan et al., 2016).
- 76% of energy used in the region is derived from the woodlands (Ryan et al., 2016).
- Traded woodfuels have an annual value of \$780 M (Ryan et al., 2016).
- Woodlands store 18-24 PgC carbon (Ryan et al., 2016).

Restoration options in the Miombo woodlands

Introducing measures to conserve Miombo vegetation will clearly impact the current economic growth trajectories of the region, but it is also clear that well-managed Miombo vegetation provides more goods and services to the people than over-

utilized landscapes. The main tree species in Miombo are clonal - which means they use root suckers to spread. This makes Miombo vegetation very resilient to above-ground disturbances like fire and wood harvesting (Syampungani et al., 2015, Gumbo, 2016), but very sensitive to land clearing activities like large-scale cultivation, because the trees do not mainly regenerate from seed. Miombo requires cyclic cutting of mature stands, silvicultural thinning and pruning in stand development stages towards maturity, through regular use of resources by rural society and others, to maintain plant diversity and productivity of the system. Growth rates in mature Miombo can be slow - 0.24cm/year (Amade et al., 2016)- but when disturbed through harvesting/wind-throw the resprouting stumps can have high regrowth rates - up to 1.4cm per year when properly managed (Syampungani, 2010). This implies that sustainable utilisation of Miombo is possible (e.g. Figure 2; Geldenhuys, 2016) if various utilization aspects are incorporated in Miombo woodlands management.

“Fires are an important ecological determinant of Miombo, but need to be correctly managed.”

Fire has been considered as negative factor for the Miombo ecology. Frequent fires can impose important changes to Miombo vegetation affecting its capacity to provide goods and services to rural and urban communities in the region. Appropriate fire regimes are contested, and depend on particular management goals. But in general fire frequency of every 3-4 years and of low intensity are key to maintain the woodlands (Ribeiro et al., 2013).

Governance issues

The economic contributions of Miombo woodlands are not adequately accounted in national GDP's, which means that they are not appropriately valued in development plans. For example the 14.8 million m³ of wood used as biomass energy annually in Mozambique (Sitoe et al., 2010), does not appear in its national asset valuation. Consequently national planning and policy

decisions are being made without a proper appreciation of the contribution of Miombo woodlands to national treasury.



Figure 2. Cyclic clearing-cropping-fallow-regrowth maintains diversity & productivity of Miombo (Source: Geldenhuys, 2016).

“Conserving Miombo does not require stopping human activities - just managing them.”

Local, national, regional, and global interests in Miombo woodlands are not always aligned (see examples below), and this is exacerbated by lack of inter-sector coordination in the Miombo woodlands management. Sector policies across the region collectively aim to address the plight of the Miombo but sustainable approaches need to be well understood and applied at country level. There is need to harmonize policy frameworks across the region to ensure collaborative effort towards the management of the Miombo.

Long-term scenario planning suggests that the urban population of Africa will double by 2030 (Campbel, 2014). This is not likely to reduce the pressure on woodland resources, but it does provide flexibility in terms of land use planning. Research demonstrates that it is possible to design development plans in Miombo, which optimize agricultural production, carbon storage and conservation objectives (Estes 2016), but this requires good research-policy relationships, and solid governance structures.

“The cost of large-scale agricultural expansion to communities who have economies intimately linked to the intact vegetation need to be quantified and considered in development plans.”

Balancing carbon storage, biodiversity conservation, food security and human livelihoods

Carbon storage: Reducing wood harvesting in Miombo will increase above-ground biomass, but will increase demand for alternative (fossil-fuel based) energy, and will negatively impact rural economies (Hofstad et al, 2009). Efforts to increase carbon storage in these ecosystems need to do a full cost accounting of the biogeochemical, environmental, and economic consequences of these interventions. However, this ecosystem historically had high levels of utilization by people and by animals like elephants, and has always burned in wildfires. It is therefore, not easy to assess the degree of utilisation that is appropriate, nor to quantify the carbon storage potential (Jindal, 2008).

Fire management: attempts to implement fire suppression/reduction targets need to accommodate the fact that fire is both necessary for the appropriate functioning of these ecosystems, and useful as a management tool to acquire resources from Miombo. Rather than a blanket approach to fire management in Miombo we suggest a multi-faceted approach that allows for a variety of fire regimes in a landscape.

Agricultural expansion: is necessary to feed the population of the region, but as Miombo vegetation does not recover easily after being ploughed the extent and type of agriculture should be carefully planned to have minimal impact on biodiversity. Likewise, the impacts of agricultural expansion on the rural livelihoods of the people who currently use the Miombo woodlands need to be included in all economic assessments.

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Policy pointers

- Political commitment and support at regional level (SADC) is critical to mobilizing harmonized policies and action by member states.
- Assessing the contribution of Miombo woodlands to national economies and valuation of forest resources will provide key information that can engage policy makers.
- Communities must be enabled to negotiate land use and management options that support multiple uses of Miombo woodlands and inform restoration strategies and plans.
- Woodfuel should be considered as part of the solution to reducing fossil fuel emissions.
- REDD+ can help to mitigate the effects of climate change and to restore degraded woodland but it needs to be balanced against other management objectives.
- Research needs to be better coordinated – both within the scientific community and between researchers and government.
- Forest policies must be formulated around the concept that the Miombo species are resprouts, light demanding and fire adapted. They should be designed to incorporate this body of science.

Role of the Miombo network in support to the woodlands restoration:

- Provide a knowledge management and collaborative research platform.
- Document best practices in the management of Miombo.
- Create a repository of information on research on Miombo woodlands.
- Produce high-quality information in support of decision-making systems.
- Communicate science results to the wider community including policy makers and practitioners.
- A conceptual framework for sustainable management of Miombo woodlands needs to be formulated to inform debate with key stakeholders including government.
- Seek for SADC recognition as a key research arm in support of regional decision-making.

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