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UTILIZATION OF FOREST RESOURCES AND SOCIO-ECONOMIC DEVELOPMENT IN UUKOLONKADHI COMMUNITY FOREST OF NAMIBIA

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Abstract

The project for community forest of Namibia has a mandate to ensure that rural communities manage and utilize forest resources sustainably in order to promote socio-economic development. Despite the absence of true forests from Namibia, which makes it difficult for timber industry to grow, there is still an abundance of non-timber forest products in Namibian forests. This research aimed at assessing the monetary value of non-timber forest products in Uukolonkadhi Community Forest. The research covered the period of five production years. The value of nine selected non-timber forest products was given in monetary terms. The results reveal that there is a potential to generate monetary income from community forests products. However, due to erratic climatic conditions, there are fluctuations in the income generation, most especially from the products that are directly dependent on the rainfall. Harvesting permits for poles was observed to be the main source of income. Some of the major observed challenges facing the project of community forest were the high level of illiteracy among the management staff. Therefore, it is of vital importance that more qualified foresters and forestry technicians are hired and allocated to all community forests. Furthermore, adequate funds are needed from the government and donors to support incentives and forest activities in community forests.

Keywords: community forest, forest products, monetary value, Namibia, sustainability

INTRODUCTION

Rural communities are the areas with the highest prevalence of poverty across the globe. However, because of poverty, which in return means lack of infrastructures, people in rural communities are living in the closeness with the nature, particularly with forest resources (Parviainen, 2012). This makes them depend on forest resources for their day to day life. For that reason, in exception of ecological functions of the forest and conservation of biological diversity, it is also

important to consider economic empowerment to improve the livelihoods of local rural residents (Mwangi *et al.*, 2013). Mbairamadji (2009) is also of the same opinion that forests provide a full spectrum of goods and services that contribute to the socio-economic development of forest dependent communities. However, it is crucial that the balance is maintained between forest resources utilization and sustainability, and to achieve this it is important that proper resources assessments are carried out as confirmed by Wollenberg *et al.* (1998) who highlighted that in modern development a problem analysis is necessary prior to the implementation of any project.

As one of the African countries with more percentage of the population (58 %) residing in rural areas than in urban areas (Indongo *et al.*, 2013), geographically Namibia is located between 17° and 29° south of the equator (Newsham *et al.*, 2009). Most of Namibia's climate is characterized by semi-arid to hyper-arid conditions and highly variable rainfall; though small stretches of the country (about 8 %) are classified as semi humid or sub-tropical (Newsham *et al.*, 2009 and Odendaal, 2011). Despite being a dry country, due to its large size, Namibia has different vegetation areas that also include woodlands and forests. However, Namibia does not have true forest, therefore forest resources are mainly defined as woody plants that are found in woodlands and shrublands (savannas) (Barnes *et al.*, 2005). Sola (2011) describes Namibia's vegetation types as mopane savanna, semi-desert and savanna transition, and dwarf shrub savanna. Namibia's natural broad-leafed forests and woodlands are located in the northern and north-eastern parts of the country, and almost no planted forests exist (Parviainen, 2012). Namibia is situated between two deserts; Namib Desert stretching along its west coast and Kalahari Desert borders which borders its eastern and southern neighbours, Botswana and South Africa. As a result, it is the driest country in Sub-Sahara Africa (Ministry of Environments and Tourism, 2011). Despite the harsh climatic conditions, Kamwi *et al.* (2016) pointed out that Namibia is among the African countries where natural resource use is vitally important to support rural livelihood (drivers of cover change are agricultural expansion, population increase and illegal logging). Unfortunately, information about growth rates of woody and non-woody forest species is lacking. This information is required to determine a sustainable harvesting regime in Namibia (Van Holsbeeck *et al.*, 2016). The reasons of the shortage of information and data include the country's weak colonial legacy as far as forestry is concerned and the relatively recent creation of the Directorate of Forestry (DoF), the main institution directly involved in forest resources assessments (Thomas *et al.*, 2003). In addition, Namibia's vegetation is faced with many natural challenges and land-use pressure that are mainly caused by fire, population increase, deforestation, bush encroachment and soil erosion (Lisao, 2015). Owing to erratic rainfalls and ever-changing climatic conditions, one can, with no doubt agree with several studies (Barnes *et al.*, 2005; Sola, 2011 and Parviainen, 2012) that revealed that true forests are absent from Namibia. All that is available are savannah woodlands and bush encroached areas that are partially distributed across the south central part of the country. As a result of all these natural conditions, Namibia's forestry sector does not contribute significantly to the gross income (Louw, 2007). On the other hand, land clearing for crop farming is largely responsible for the decline in forest area in Namibia (Van Holsbeeck *et al.*, 2016). Due to the expansion of agriculture, primarily in form of small-scale cereal and pastoral production, woodland savannah area decreased from 90 % of North Eastern Namibia in 1975 to 83 % in 2004, and then increased to 86 % in 2014, while agricultural land increased from 6 % to 12 % between 1975 and 2014 (Wingate *et al.*, 2016). Forest fires are listed among serious threat to the Namibian forests, both anthropogenic and natural. Many fires burn out of control due to wind and some areas are burnt every three years on average (Mendelsohn and Obeid, 2005). However, people in rural localities still benefit a lot from forest resources; for food, wood crafts and construction materials (Nikodemus and Hájek, 2015).

Owing to poor climatic conditions, geographical location within the subtropical atmospheric high-pressure zone contribute to its aridity, the country experiences low and unpredictable annual rainfall, soils infertility and a high rate of evapo-transpiration. The North-Central regional topography is characterized by an extremely flat plain, which forms part of the Etosha depression, and hills in the west (Hainduwa, 2013). The land use is characterized by an agro-silvi-pastoral system which combines livestock herding and smallscale cereal production, supported by a variety of timber and non-timber resources (Newsham and Thomas, 2009). Omusati region is primarily dominated by *Colophospermum mopane* tree species which is locally known as omusati. Common tree species found in the area are *Baikiaea plurijuga, Commiphora angolensis* and

Commiphora mollis (Kanime and Laamanen, 2003). Giess (1971) distinguishes between three main vegetation zones, desert (16 %), Savannah (64 %) and dry woodlands (20 %).

Forests continue today to provide the high levels of commercial benefits to households, companies and governments (Agrawal *et al.*, 2013). In the same light, Barnes, *et al.*, (2010) stated that forest resources use resulted in direct contribution to the gross national product (GNP) of N$ 1 billion (US$ 160 million), which is about 3 % of the GNP. The main contribution is from Non-Woody Forest Products (NWFPs). Due to the poor tree abundance, saw timber harvesting is restricted in Namibia (Barnes *et al.*, 2005). Moreover, in poorly forested countries like Namibia it is crucial to understand that forest resources utilization can cause degradation and eventually loss if environmental, economic and social goals are not fully recognized. This usually happens as a result of local residents carrying out economic activities in ways that deplete forests because they gain immediate economic benefits (Mogaka *et al.*, 2001). Also, as due to economic pressure, the use of forest resources by local rural communities has imposed a great threat to the forests. This is more serious in poorly forested countries like Namibia. Most rural residents are harvesting forest resources illegally to generate income to sustain their livelihood. In an attempt to compact illegal harvesting, the Namibian Community Forests Policy of 2001 has mandated local community members living in the vicinity of gazetted community forests to manage and utilize forest resources sustainably. This also includes the right to generate income from forest products provided that sustainability is at all costs taken into consideration (CFN, 2008; Parviainen, 2012).

The steady deforestation in tropical forests led to the question of whether the forest management and policies have been implemented effectively. This is because on a global scale, during the period of 1981–1997 about 11.9 million hectares of tropical forests have been lost (Mbairamadji, 2009). As an effort to mitigate deforestation, DoF has realized that deforestation can only be conquered by making local communities feel the ownership and the responsibility to utilize, manage and sustain the forests resources rather than depleting them (Schusser, 2012 and CFN, 2008).

Consequently, this paper aimed at assessing the monetary value of forest products in Uukolonkadhi Community Forest. Alongside monetary value assessments, the paper also targeted to assess how the balance between forest resources utilization for socio-economic development and sustainability is maintained.

MATERIALS AND METHODS

The study was faced with a number of challenges like the shortage of fresh computerized data from the field which made the researcher to have some difficulties in data collection process. The lack of all the necessary reliable data was the most challenging limitation. FMC members have no experience or background on financial management. There are no comprehensible records for the cash flow, income statement and balance sheets. It is for this reason benefitcost ratio analyses could not be applied to this study. This is due to the low level of education, especially among the traditional authority. High degree of illiteracy in the community, much more that most of the respondents are not fluent in the national language, which is English, and the level of understanding of forestry disciplines and enterprise potentials among community residents made it difficult to obtain dependable information. Additionally, lack of fresh prior researches also made it tedious to review the literatures. This is because, despite the considerable entrepreneurship potentials, the Namibia's forests economic significances are not apparent. As a result, many researchers are neglecting forestry sector economy. Different families' routines resulted in some inconveniences as some household's heads could not be successfully interviewed on the appointment dates. Another major limitation was the global problem of climate change. The fluctuation in climate and rainfalls of Namibia, especially in the North- Central regions affected data collection as in some years, for instance, in 2011–2013 when there were no good rainfalls. This means there are no comprehensive records for the NTFPs like mopane worms that rely of rainfall. Some of the NTFPs could not be successfully assessed because individual community residents harvest them from the CF with no restrictions, thus no records are kept.

About 4,000 plant species have been identified in Namibia, of which 10 % are woody trees (Mendelsohn and Obed, 2005). In the northern parts of Namibia, marula (*Scelerocarya birrea*) and berchemia, manketti (*Schinziophyton rautanenii*), *Acacia erioloba* and *Makalani palms* (*Hyphaene petersiana*) left standing among agricultural crops either provide microclimates in the arid

environment suitable for cropping, improve soil fertility, or provides fruits and nuts, in what are excellent examples of indigenous agro-forestry systems. Uukolonkadhi Community Forest (100,000 ha) is situated in Omusati Region in the North-Central of Namibia (see Fig. 1). This area is part of the Kalahari and Namib sands (Kanime and Laamanen, 2003). Demographically, the North-Central is the most populated area of the country (Newsham *et al.,* 2009). The climate in Omusati Region is generally described as semi-arid with an average annual rainfall between 300–350 mm (Atlas of Namibia, 2012).

The method employed in this study incorporated quantifying monetary value of forest products. Quantitative data about monetary value of forest products were collected from Outapi and Onesi District Forestry offices. These are the two forestry offices responsible for Uukolonkadhi Community Forest. The research concentrated on monetary values of forests products from Uukolonkadhi Community Forest during the period of 2009–2016 production years according to DoF calendar. Nine forest sources of income; (a) harvest permits for poles, (b) harvest permits for firewood, (c) auctioned poles, (d) fines, (e) seedlings; (f) mopane worms, (g) honey bee, (h) fruits and (i) wood transportation permits were sampled. The sampling was aimed at answering the following research questions:

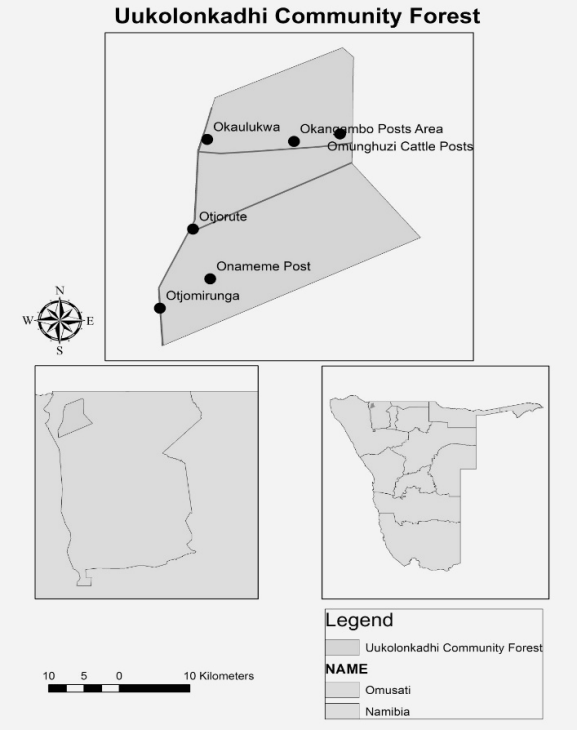
1. What are the main forest resources that contribute to rural livelihood?
2. What is the monetary value of forest sources in Uukolonkadhi Community Forest?
3. Are the available resource sufficient for socio-economic development at community level?

The study was conducted between September and December 2016 and then revised between November and December 2017. In order to supplement the summarized reports from households and office surveys and to obtain an appropriately searching analysis of the findings, monetary values for the main forest sources of income were analysed and quantified. According to Nikodemus and Hájek (2015), one of the main challenges with community forests studies is the lack of the data. Therefore, there was no data available for the year 2012–2013.

RESULTS

Consistency in income generation

Parviainen (2012) reports that the main Namibia's forest products are fuel wood, saw timber, poles, and non-timber forest products like mushroom, palm leaves, mopane worms, fruits, seeds, roots and traditional medicines. As mentioned earlier, the research sought to



1: *The location of Uukolonkadhi Community Forest on both the Namibian and Omusati Region map*
Source: National Remote Sensing and Mapping (2016)

I: *Income generated from Uukolonkadhi Community Forest during 2009–2016*

Production period	Permits for poles	Permits for firewood	Auctioned poles	Fines	Bees	Mopane worms	Seedlings	Fruits	Wood Transportation permits	Sub-total
2009–2010	20,015	888	940	200	150	–	–	–	–	**22,193**
2010–2011	29,475	15,46	735	58	661	2,106	4,096	–	–	**37,131**
2013–2014	18,234	11,094	145	–	–	–	416	25	–	**29,914**
2014–2015	29,475	15,46	735	58	661	2,185	4,096	–	–	**37,210**
2015–2016	9,375	22,38	785	930	–	–	80	–	219	**11,389**
Total	**106,574**	**11,982**	**3,340**	**1,246**	**1,472**	**4,291**	**8,688**	**25**	**219**	**137,837**

Source: own elaboration

quantify the monetary value of forest resources in Uukolonkadhi Community Forest over the period of five production years. That is from 2009–2016. Owing to the natural conditions of the forest which is the result of the dry climatic conditions of the country, the research could only concentrate on a few forests products as shown in Tab. I. All the income figures are presented in Namibian Dollars (N$)[1].

The area is dominated by *Colophospermum mopane* which provides many non-timber forest products such as mopane worms (*Imbrasia belina*), which attract many harvesters from other regions (Hainduwa, 2013). Apart from Mopane, *Terminalia sericea* is another economically important species from which people produce farming tool handles like hoes and axes, because of its good quality. Honey bee production has a long tradition in UCF, even though it has not been considerably commercialized owing to the fact that there are few people with keeping and harvesting skills. About 90 % of the subsistence farmers in UCF use pestles and mortars to pound farm products like pearl millet (*Pennisetum glaucum*) grains, locally known as mahangu on a daily basis. Pestles and mortars are household tools that cannot operate separately from each other. The pestles and mortars are, therefore, some of the forest products of economic importance in rural areas. Pestles and mortars are still very important in rural areas of Namibia and their sales take place every year. In the regions of Caprivi and Kavango, about 66 wild fruit tree species have been identified.

Income generation has been consistence only in some of the resources such as permits for poles, permits for firewood and auctioned poles. The rest of the resources did not show consistence in income generation. For instance, it was observed that there were no income generated from mopane worms during 2009–2010; 2013–2014 and 2015–2016. Similarly, no income were generated from honey bees during 2013–2014 and 2015–2016. Furthermore, fruits are listed among the least products and only yielded a little amount in 2013–2014. The same goes for wood transportation permits from which a small amount was only generated in 2015–2016.

During the production period of 2009–2016 the highest income was generated permits for poles (N$ 106,574). This is because poles are the main forest products in most forests and woodland of Namibia. Therefore, in order to prevent overharvesting of poles harvesting permits are issued at a reasonable price depending on the amount of poles they wish to harvest. Additionally, the amount of poles to be harvested is guided by the five-year management plan which is usually based on forest assessment (inventory) reports.

Harvesting permits for firewood is another source of income that yielded a good amount (N$ 11,982). Majority of the rural communities do not have access to formal power supply, particularly electricity. As a result, these local residents depend on firewood for heat and, in some cases, for light energy. Again, it is the responsibility for DoF to regulate the harvesting of firewood

1 1 Namibian dollar = 0.06984 U.S. dollars

through the issuance of permits. And in the process, income in monetary terms is generated.

Due to economic pressure and poverty some local rural residents are forced to do illegal harvesting in order to make money to sustain their livelihood. In attempts to mitigate illegal harvesting, DoF staff conducts forest patrols around community forests. A fine is issued by DoF to anyone who is caught harvesting, transporting or selling forest resources without a permit. However, the law enforcement by DoF in Uukolonkadhi Community Forest seems to have this situation under control, hence the income generated from fines is just N$ 1,246 over five years. Wood transportation control is one of the ways to enforce forestry law. Moreover, forest resources are mainly utilized at a community level, thus there is no much transportation of forest products and hence the income generated from transportation permits was relatively low (N$ 219) over the period of five years.

Namibia's forests and woodlands are characterized by thorny and bushy shrubs. Fruits trees are scarce and most of them are not suitable for commercial purposes. However, DoF made efforts to establish orchards from where fruits are harvested and sold at community level. Nevertheless, harsh climatic conditions are the main constraint for the orchards yield good harvest. For that reason, the least total income was generated from fruits (N$ 25) over the production period of 2006–2016.

Total income per year

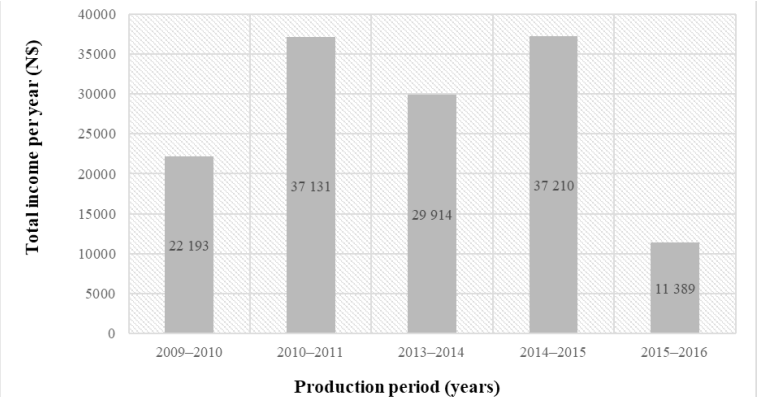
Total income generated from forest resources vary with years (Fig. 2).

In comparison with the rest production years, 2013–2014 has the highest total income (N$ 37,210) just slightly higher than the year 2010–2011 (N$ 37,131). The year production year 2015–2016 is the least with the total income of N$ 11,389. There has been a fluctuation in the income generation over the years. This mainly because not all the products could generate income every years owing to the ever changing climatic conditions of Namibia. For example, poor rainfalls were received in years 2009–2010 and 2015–2016, especially in the northern regions of the country. This has greatly affected the community forest production and consequently the total income which amounts to.

As highlighted earlier that records taking in community forests needs improvements, the results show that there are no records for the production year of 2011–2012.

DISCUSSION

Despite the limited timber products in most of Namibia's forests and woodlands, there is a range of forest resources from where local community generate income. Even though the income from community forests is not sufficient for the establishment of forest enterprises, it can still support forest management activities at community level. There has been a number of studies conducted about forests of Namibia, for example (Krug, 2017; Mbidzo, 2016; Ndeinoma *et al.*, 2018; Schusser *et al.*, 2016). The study of Krug (2017) reveals significant differences of the water potentials indicated by C. mopane (the impacts of seasonal conditions and site on the selected species). However, to assess the consequences of different causes of action is not enough to merely know that the ecosystems are valuable, but to know how valuable they are and how that value is affected by different forms of management as well (Pagiola *et al.*, 2004). There is a huge knowledge gap about the monetary value of community forest resources. This is why this



2: *Total income per production year over the period of five years*
Source: own elaboration

study sought to assess the monetary value of forest resources in Uukolonkadhi Community Forest.

Alongside conservation, the project of community forests also aims to alleviate poverty (Baral, 2008). However, the findings of this research show that like in other Eastern and Southern African countries, forestry sector of Namibia is not economically viable (Mogaka *et al.*, 2001). Forestry production for commercial purposes in Namibia is disadvantaged by a number of natural factors ranging from climatic to topographical conditions (Newsham and Thomas, 2009 and Odendaal, 2011). Namibia is disadvantaged by illiteracy too. In Namibia was carried out research, for example, by Semali *et al.* (2012). They define literacy "as the range of practices involved in the alphabetic coding of socially and culturally relevant signs and symbols". According to Edmunds *et al.* (2001) the poorest forest user is worse off now than before. Farmers faced a cycle of poverty (Semali *et al.*, 2012). Overpopulation is another important factor and a problem of Namibia.

Decentralisation policy is seldom followed by genuine power devolution to the local users (Ribot, 2004; Schusser *et al.*, 2016). Due to the dry condition of the country, most of the resources are not harvestable for commercial purposes. According to Krug (2017) droughts may even accelerate deforestation and are pushing forest ecosystems towards a 'tipping point'. Poor rainfall has been recorded in the past years as a result of the global phenomenon of climate change (Prabhakar *et al.*, 2007). On the other hand, according Hély *et al.* (2006) and Lucht *et al.*, 2006) the impact of global change on Africa's dry forests is unclear as predicted climate changes vary at a regional scale. According to De Cauwer *et al.* (2016) there is inadequate information on the current state of forest ecosystems to disentangle climate change from other environmental effects. The identification of more drought tolerant tree species for reforestation schemes will be of fundamental importance (Krug, 2017; Serrano *et al.*, 1999). Consequently, it is a tradition that forests in Namibia are managed primarily for ecological and preservation purposes. To successfully achieve this goal, DoF is determined to equip and empower local farmers and residents within the vicinities of community forests to manage and utilize forest resources in sustainable manners (Schusser, 2012). Continuous efforts are made to assess forests resources availability and to enforce laws against deforestation (Parviainen, 2012).

The results of this research further prove that due to the poor woody forest resources abundance in Uukolonkadhi Community Forest, the monetary value from woody products is not significant. The only woody sources of income are poles and firewood in form of permits. This proves that the biggest portion of forest monetary value is from the community forest administrative activities, i.e. fines and permits issuance. On the other hand, the amounts (N$ 3,340) over five years from confiscated poles and fines should encourage stricter forest control and protection measures to reduce illegal harvesting, most especially for poles (Barnes *et al.*, 2005).

Another challenge the forests of Namibia are faced with is the rural population expansion (Mwangi *et al.*, 2013). As the population increases, so does the demand for agricultural land which eventually, exerts pressure on forest ecosystems. Kamwi (2016) suggests that state interventions can play a significant role in promoting more sustainable natural resource usage. This will enable effective decision-making to reconcile the efforts of sustainable development and natural resource management. This means that DoF efforts alone are not enough. Therefore, consistent support from multiple stakeholders is of a vital importance.

Additionally, more international donors and funding agencies are needed to enhance forestry management and assessment activities at local level (Kojwang and Chakanga, 2001). Also, human resource at local level needs strengthening. For instance, most of Traditional Authority and FMC members are illiterate. This makes it hard for them to keep comprehensive records of the available forest resources. This on the other hand, makes it hard for them to fully understand the Forest Policy and guiding principles. To best tackle this constraint, one or two qualified forest technicians should be planted in each community forest. Another tool that can be used is perpetual forest resources awareness campaigns.

CONCLUSION

Despite the absence of true forests which makes it hard for timber industry to grow, Namibia is endowed with a variety of woody and non-woody forest resources. Forest species richness is good with a list of plants species amounting to 4,300 (Lisao, 2015). Forest products are mostly valuable at communal level. However, it is important that sustainable use measures are enforced to ensure that

forest resources are not depleted. It is for this reason this study deemed necessary to assess the value of forest products on a monetary scale. To carry this out, the Uukolonkadhi Community Forest was the case study for this research. The research was based on these three questions: (a) What are the main forest resources that contribute to rural livelihood? (b) What is the monetary value of forest sources in Uukolonkadhi Community Forest? (c) Are the available resource sufficient for socio-economic development at community level?

The monetary values of the sampled forest resources in Uukolonkadhi Community Forest prove that forests in Namibia can still play their role in contributing to socio-economic development in rural communities provided that sustainable utilization is applied at all costs. Local community benefit from forest products such as firewood on a daily basis. Unfortunately, most of the products are greatly influenced by climatic conditions; rainfall in particular. The study reveals that in production years when little rainfall was received the total income generated from forest products in Uukolonkadhi Community Forest dropped drastically. Apart from rainfall, there are other challenges facing the project of community forest in Namibia. For instance, there is no direct financial support from the Ministry of Agriculture, Water and Forestry (MAWF) and other governmental organizations (Nikodemus and Hájek, 2015). Therefore, the income generated from forest products is mainly used to support the administrative activities of the community forest. This is also where the management staff members, namely FMC and Traditional Authority (TA) get wages from. Both FMC and TA are the central engine for forest resources management at community level, and hence the pillars in supporting sustainable utilization of forest resources. Therefore, keeping them motivated in their roles is crucial for the sake of community forest protection.

Another huge threat to the project of community forests of Namibia is the high level of illiteracy among the management body at community level. The FMC and TA members also need proper training on forest resources management. Also, support from qualified forestry technicians will make a significant difference in various community forests. Another urgent effort that needs to be made is the supply of up-to-standard forestry facilities, such as computers and reliable internet access in community forests.

The policy should take two orientations, one on timber products and the other of NTFPs such as fruit trees, medicinal plants and plants with natural products that can be used in cosmetic industries such as Oompeke (***Ximenia***) and Omumbiri (***Commiphora*** spp.) etc.

The topic of sustainable forest management occupies an important role in the debate on the future of the forest. In the future, the long-term support provided for the Namibian forests should focus more on the adoption of sustainable production methods that strike a balance between the economic, social and environmental concerns (Iacob, 2014). Further research projects and public awareness on this subject should be encouraged and adequately funded by both the government and potential donors in order to educate the rural communities and the public at large about the current state of the forests of Namibia, their importance and how they can be utilized sustainably.

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