Original Research Article

STATUS, CHALLENGES AND MITIGATION STRATERGIES OF PRODUCTION OF NON TIMBER FOREST PRODUCTS IN MUNDEMBA MUNICIPALITY, SOUTHWEST REGION CAMEROON

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ABSTRACT

Land clearing for plantation and settlement establishment has been a prominent driving force for forest ecosystem destruction. This study aimed at evaluating the status, challenges and mitigation strategies of the selected NTFPs produced and Marketed in the study site. This study was carried out in the municipality of Mundemba South West Region Cameroon. Data were collected with the used of open and close ended questionnaires, key informants interviews and field observations. The questionnaires were divided into IV sections. Section I socio-demographic characteristics, section II on the status of the different NTFPs produced and marketed section III on the challenges and section IV on mitigation strategies. Data were subjected to descriptive analyses and were treated using statistical software program IBM SPSS statistics. Chi square Pearson test was used to determine the association. Results showed that 59.00 percent were men while 41.00 percent were women. Based on the IUCN red list categories, 6 of the NTFPs were noticed as least concerned, 4 of the NTFP species are near threatened, while none of the species were noticed to be extinct. The main challenge for production was limited land with 51.00 percent while the least challenge of limited knowledge for production was noticed to 2% and was not significantly different(x^{2cal} = 0.593, $x^{2\ table\ value}$=0.917). The main challenge for marketing was reported as insecurity with 39 % while the least was failure of buyers to keep to time with 8.00 percent and was significantly different (X^{2cal}= 1.052,$x^{2\ table\ value}$ =0.958). The government strategies for mitigating challenges of production and marketing (x^{2cal} =2.988, x^{2cal} =0.224) was significantly different. The major mitigation of road construction had a percentage of 83.00 percent, while the least noticed for mitigations production and marketing was provision of farm inputs with a percentage of 6 %. Therefore, proper management will definitely lead to improve production and marketing of NTFPs

Key words: Land clearing, food insecurity, re-afforestation, forest management

INTODUCTION

Over the past years, land clearing for agriculture and other purposes has been a dominant force affecting the extent and condition of the world forest [1]. Cultivating trees and agricultural crops in intimate combination with one another is an ancient practice that farmers have used throughout the world to replace trees that were lost through land clearing [2]. One of the vital products obtained from agro forestry system is non timber forest products.

According to [3] NTFPs consist of goods of biological origin other than wood, derived from forest, other wooded land and trees outside forest. In Africa, more than two thirds of the population relies partly on forest products to satisfy their livelihood needs [4,5,6].

[7,8] reports that NTFPs include fruits, nuts, seeds, flowers, leaves, twigs, tree barks, stems, spices, medicinal plants, ornamental plants, bamboo, rattans, ropes, resins, oil dyes, mushrooms and wildlife.

The role of NTFPs varies from one place to another depending on the economic and cultural contexts, in developed countries; for instance, NTFPs are usually used for cultural and recreational purposes, biodiversity conservation, and rural economic development. In developing countries, especially in Africa and Asia, and they are mostly utilized for subsistence and income generation [9, 10,11]. Due to uncontrolled harvesting of forest products and destruction of other plant species within the ecosystem these have led to modification of habitat, pushing most of these species into new conditions [7,12, 13], rendering them rare, threatened and others extinct .

Aside from timber, NTFPs plays an important role in providing between 29.00 percent-39.00 percent of food, medicine and income needs to about 80.00 percent of the local populations living in the forest areas of Central Africa [14].

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The trade of non-timber forest products is being recognized by conservation and development organizations as a potential source of income for rural population to manage sustainably and avoid depletion. Collection and marketing are been promoted as potential solution to the current high rates of malnutrition and the poor health population and the spread and intensification of poverty reduction [15,16]. The increasing focus on development policy on poverty reduction has however, brought with it a need for unequivocal and more differentiated evidence about whether and how much NTFP commercialization can contribute to poverty reduction [17,18].

Over the past 30 years, Cameroon has experienced major deforestation and forest degradation resulting from a combination of factors related to agricultural expansion, population increase and rapid urbanization and general development activities [6,19]. This has reduced the supply of many of its different forest products, such as animals, leaves and fruits. However, when the value of NTFP and intensity of its use are extremely high, it is overexploited; supplies of it may be exhausted, causing it to become locally extinct [20].

According to [21,22], Cameroon's forests offer a large supply of NTFPs used for subsistence and medicinal purposes and traded in local and international markets. [17] had anticipated, these NTFPs are the major source of reducing poverty. Human activities such as agriculture, extraction of NTFPs and infrastructural development as a result of population increase and urban growth has been attributed as primary causes of biodiversity loss [23]. Apart from human activities on the underlying causes such as weak institution, poor governance and inadequate law enforcement also contribute substantially to biodiversity.

Despite the enactment of forestry Law No.94\01 of 20 January 1994 of biodiversity conversation in Cameroon, there is still a great loss of biodiversity in is forest [24]. It is for the above reasons that this research w aimed to study the status, challenges and mitigation

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strategies of production and marketing of non timber forest products in the municipality of Mudemba,

1. MATERIALS AND METHODS

2.1 Study site

This study was carried out in the Mundemba municipality, Southwest Region, Cameroon (Figure 1). Mundemba has an equatorial climate with two main seasons: the dry and the raining season. The dry season is usually very short and runs from November to February while the wet season is long and it's between March to October [25]. Monthly rainfall recorded indicated that maximum rainfall occurs from June to October while the minimum rainfall is between December to February. The mean monthly temperature ranges from 23^0C to 30.00^0C with a mean maximum monthly record of 33.5^0C between January- March, and a minimum monthly record of 22.50^0C in January [25].

The Mundemba municipality is composed of a stretch of hilly topography. It is made of gentle slopes gradually increasing as we go from the south west coast of river Ndian to the undulating slopes of the Rumpi Hills forest reserve in the south west, stretching right up to Toko sub division [25]. Another stretch of undulating hilly topography is found in the south east of the municipality, around the northern part of the Rumpi forest reserve. The proposed council forest is relatively flat with dotted areas of undulating gentle slopes [25].The municipality is drained by streams and rivers. Most of the rivers and streams take their rise from the Rumpi hills and the northern part of the Korup national park (KNP). Rivers and streams that take their rise from the Rumpi hills and flows towards the northern section of the proposed council forest while those that take their rise from the northern part of the KNP

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flow in a southern direction of the park. The streams in block A combine to form the Mana and Mbo's rivers that finally drain into river Ndian and the Atlantic Ocean while the main stream Mossambi in block B converge with river Lokeri and drains into Dibonda river, which empties into the Atlantic Ocean. [25].The soils are heavily leached as a result of their low water retention capacity and the frequent heavy rainfall in the municipality. The forest is quite dense and virgin and frequently encountered species with commercial names include: Bubinga, Moabi, Iroko, Bilinga, Poga, Azobe, Ekop Naga, Tali, Okan, Framire and Dabema. Other occurring species are Ilomba, Niova, Padouk, Movingui, Aiele and several others less utilized timber species. The proposed council forest area also contains a variety of non-timber forest products (NTFPs), of high economic value such as Bush mango, Njansang, Bush onion, Bush pepper, bitter kola, Eru, Shell nuts and several others with less economic potential [25].

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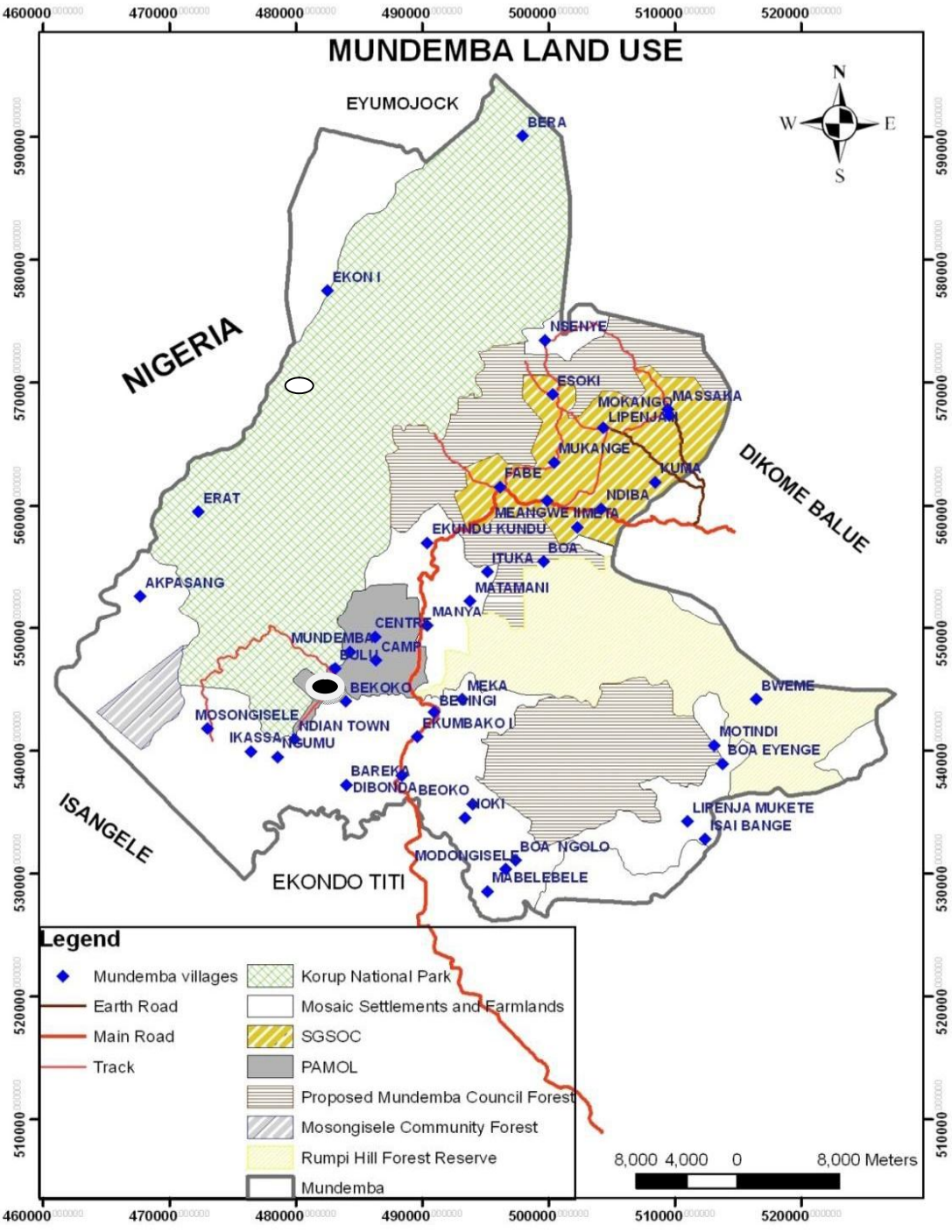

Presentation of study site

Figure 1. Map of land use types of Mudemba showing the study site

Source : [25].

1.2. Studied population

The sample population was made of 100 members comprised of men, women and youths who are into production, gathering and marketing of NTFPs in the study site

1.3. Primary data collection

Primary data was collected by means of a well-designed questionnaire made up open and closed ended questions sectioned into four parts. Part one was on the social characteristics of the respondents, Part two was based on the status of production and Marketing NTFPs and part three covered the aspect of production and marketing challenges of NTFPs in Mundemba municipality. Part Four was on the strategies of mitigation.

1.4. Secondary data collection

Secondary data was gotten from scientific publications, electronic documents (internet), and documents in some institution like the Mundemba City council, Divisional Delegation of Agriculture and Rural Development Mundemba, and PAMOL plantation.

2.5 Data Analysis

Questionnaires were checked for completeness, counting and grouping of both single and multiple responses. Data was subjected to descriptive analyses and was treated using statistical software programmes IBM SPSS statistics (using simple statistical methods such as descriptive statistics amongst which frequency distribution, percentages, explanatory statistics, Chi square Pearson were used to determine the association of variables.

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2. RESULTS

3.1. Socio demographic characteristics of respondents

The sex ratio as shown on table 1 shows that 49 % were female and 51 % were male**.** The study revealed that 72 % were married while 28 % were single (Table, 1).

The family size showed that 50 % of the farmers were between 1-5 persons, 38 % were between 6-10, and 11-15 had 12 %**.** The result of the study also showed that 37 % had primary education, 24 % had secondary education, and 25 % had a tertiary education while 13 % had no formal education (Table 1).

Table 1 shows the years of duration of the farmers in NTFPs gathering. 62% of the farmers have stayed in that area for a period > 16 years. This was closely followed by 29 % with farmers who have stayed for a period 11- 15 years and the least 5 % who have stayed for 1-4 years (Table 1).

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Table 1 Socio demographic characteristics of NTFPs farmers

Characteristics		%Frequency	Percentages
Sex ratio			
	Male	59	59.0
	Female	41	41.0

	Total	100	100
Marital status			
	single	28	28.0
	married	72	72.0
	Total	100	100
Family size			
	1-5	50	50.0
	6-10	38	38.0
	11-15	12	12.0
	Total	100	100
Level of education			
	Primary	37	37.0
	Secondary	24	24.0
	Tertiary	25	25.0
	no formal education	13	13.0
		99	99
Total		100	100
Duration (years)			
	1-5	4	4.0
	6-10	5	5.0
	11-15	29	29.0
	16 and above	62	62.0
	Total	100	100

2.2. Types and status of Non timber forest products

Table 2 shows that 4 of the NTFPs (*Tetracarpidium conophorum, Afrostyrax lepidophyllus,* and *Garcina mannii* were considered rare while 7 (*pipe r*spp, *Gnetum africanum, Garcina cola, Irvigia gabonensis, Cola acuminata, Cola lepidota* and *Mucunasloanei* were noticed to be available in the local community (Table 3). Based on the IUCN red list categories, Six (6) of the NTFPs (*pipper* spp, *Tetracarpidium conophorum, Cola acuminata, Cola lepidota, Ricinodendron heudelotii* and *Mucuna sloanei*) were noticed as least concerned, 4 of the NTFP species (*Gnetum africanum, Afrostyrax lepidophyllus, Garcina cola* and *Irvigia gabonensis* were near threatened , while none of the specie were noticed to be extinct (Table 2).

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Table 2: Status of some of NTFPs in Mundemba

Family	Species	Common name	Parts used	Uses	Status in Mundemba		IUCN COMMENTS			
					Available	Rare	Least concerned	Near threatened	Extinct	references
Piperaceae	*Pipper Spp*	Bush Pepper	Leaves	Condiment	√	-	√	-	-	[26]
Gnetaceae	*Gnetum africanum*	Eru	Leaves	Food	√	-	√	√	-	[27]
Euphorbiaceae	*Tetracarpidium conophorum*	Cashew	Seeds	Food	-	-	√	-	-	[28]
Huacaceae	*Afrostyraxlepidophyllus*	Bush onion	Seeds	Condiment	-	√	-	√	-	[29]
Guttiferae	*Garcina kola*	Bitter cola	Seeds	Medicine	√	-	√	-	-	30
Irvingiaceae	*Irvingia gabonensis*	Bush mango	Seeds	Condiment	√	-	-	√	-	[31])
Sterculiaceae	*Cola acuminata*	cola	Seeds	Stimulant	√	-	√	-	-	[32]
Sterculiaceae	*Cola lepidota*	Monkey cola	seeds	Fruit	√	-	√	-	-	[33]
Euphorbiaceae	*Ricinodendron heudelotii*	Njansang	Seeds	Condiment	-	√	√	-	-	[29]
Guttiferae	*Garcinamannii*	Chewing stick	Stems	Local toothbrush	-	√	√	-	-	[30
Mucuna	*Mucunasloanei*	Ebaba	seeds	condiments	√	-	√	-	-	[26]

√ = Present - =Absent

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2.3. Challenges in production and marketing of NTFPs

As shown in table 3 the main challenges noticed for production were limited land, limited knowledge of farm techniques and poor planting material showed no significant different (x^{2cal} = 0.593, $x^{2\ table\ value}$=0.917). However, the main challenge was limited land with a percentage of 51.00 percent (Table 3) while the least challenge of limited knowledge for production was noticed at 2.00 percent (Table 3).

Another challenge observed was gathering of NTFPs which showed a significant different (x^{2cal}=5.150,$x^{2\ table\ value}$ = 0.161). The main gathering challenge noted was intensive labour with 45 % while the least was poor harvesting skills.

Also, poor harvesting was noticed as a challenge but showed no significant difference (x^{2cal}=0.331,$x^{2\ table\ value}$ =0.600). The main challenge observed for processing techniques was poor drying facilities with a percentage of 84.00 percent while the least processing challenge noticed was unavailable processing unit with a percentage of 4 % (Table 3).

Marketing was also noticed to have shown some challenges (Table 3) and the challenges were significantly different (X^{2cal}= 1.052,$x^{2\ table\ value}$ =0.958) (Table 3). The main marketing challenge reported was insecurity (political up rising) with a percentage of 39.00 percent while the least marketing challenge was recorded as failure of buyers to keep to time with a percentage of 8.00 percent (Table 3).

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Table 3. Challenges of production and marketing of NTFPs in Mundemba

Aspect	variables	Frequency	x^{2cal}	$x^{2\ tab}$
Challenges of Production	Limited land	51		
	Limited knowledge of farm techniques	2		
	Poor planting material	17		
	Limited knowledge and poor planting material	4	0.593	0.917 ns
	Limited land and limited knowledge	26		
Total		100		
Challenges of gathering	Long distances	28		
	Labour intensive	45	5.15	0.161 **
	Poor farm roads	16		
	Poor harvesting skills	11		
Total		100		
Challenges of processing	Poor drying facility	84		
	Poor storage facility	12	0.331	0.600 ns
	Uavailable processing units	4		
		100		
Marketing challenges	Low prices	12		
	Poor farm to market road	13		
	Failure of buyers to keep to time		1.052	0.958*
	Insecurity	9		
	Give to middlemen on credit	6		
		39		
		11		

($x^{2calculated}$, $x^{2tabulated;}$ if $x^{2calculated} > x^{2tabulated}$ then test is significant then reverse is true) (^{at} $p<0.05$, * significance, at $p<0.01$ **significant, ns not significant)

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2.4. Mitigation strategies and techniques

As shown on table 4, the government strategies for mitigating challenges of production and marketing (x^{2cal} =2.988, x^{2cal} =0.224) were significantly different with the main mitigation aspect of road construction had a percentage of 83.00 percent, while the least noticed for mitigation for production and marketing was provision of farm inputs with a percentage of 6.00 percent (Table 4).

In respect to mitigation for the community for production and marketing of NTFPs showed no significant difference (x^{2cal} =0.380, x^{2cal} =0.502). The major mitigation techniques used by the community for production and marketing were stop indiscriminate harvesting with a percentage of 38 % and fix farm to market roads with a percentage of 36.00 percent The least noticed was domestication of NTFPs (Table 4).

Based on Table 4 the mitigation strategies used by the farmers showed significant differences (x^{2cal} =7.455, x^{2cal} 0.059). The major mitigation mentioned was increase domestication 45.00 percent and was closely followed by use genetically improved seeds 24.00 percent, while the least mentioned mitigation technique was build storage facility with a percentage of 11.00 percent (Table 4).

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Table 4 mitigation and techniques of production and marketing of NTFPs

Aspects	Variable	Frequency	x^{2cal}	$x^{2\ tab}$
Government mitigation	Construct roads	83	2.988	0.224*
	Provide farm inputs	6		
	Regularization of price	11		
Community mitigation	Fix farm to market roads	36	0.38	0.502ns
	Stop indiscriminate harvest of NTFPs	38		
	Domesticate NTFPs	26		
Farmer mitigation	Build storage facility	11	7.455	0.059**
	Increase domestication	45		
	Use genetically improved seeds	24		
	Build drying facilities	20		

($x^{2calculated}$, $x^{2tabulated;}$ if $x^{2calculated} > x^{2tabulated}$ then test is significant then reverse is true) (at $p<0.05$, * significance, at $p<0.01$ **significant, ns not significant)

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3. DISCUSSION

4.1. Socio demographic characteristics of NTFPs respondents

As shown in Table 1 sex ratio was also noticed as important socio demographic parameters. The result shows that the percentage of male respondents were 51.00 percent and 49.00 percent female (Table 1). Though, NTFP production and marketing has been reported as a feminine activity [34], but recently many more men are interested in the collection and gathering of NTFPs for income generation. This finding is in line with that of [34] who mentioned that most men are getting involved in domestication and gathering of NTFPs mainly for income.

It was observed on Table 1 that most of the respondents were married with 72.00 percent and those that were single were 28.00 percent. This could be due to the fact that those that were married had an urge in NTFPs production and marketing as compared to those that were singled. This finding is in agreement with [35], who reported that both married and unmarried are involved in the collection of NTFPs as noticed in snail searching in the night were family took up torch lights in search for snails.

Majority of the respondents had a small household size of 1-5 with 50.00 percent while the least was 11 to15 with percentage of 12.00 percent (Table 1). This is an indication that during peak period labour could be solicited due to small household size. The small household size recorded could also be linked to rural exodus in which most of the younger generation has relocated to urban areas in search for greener pastures. This finding ties with that of [36], who mentioned that most youths move to urban areas in search for jobs and to learn a trade.

Most of the respondents had a level of education (Table 1). Majority of the respondent had primary education with 37.00 percent and 13.00 percent had no formal education. The high level

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of literacy amongst the farmers may ease transmission of vital information taught and learning of new techniques in domestication of NTFPs. This finding is accordance with [37], who mentioned that basic knowledge of the farmers could help the farmers to comprehend basic information on market issues and new techniques in production.

The duration of the farmers in the area plays a major role in production and marketing. Farmers who had longer duration in NTFPs production and marketing recorded a percentage of 62.00 percent and the least of 1-5years with percentage of 4.00 percent Farmers with longer experience in NTFP production and marketing may produce and market better than farmers with few years of experience. This finding in conformity with that of [38], who concluded that farmers may produce better and market better in NTFPs since they have master the production and market for have been in the sector for a long period of time.

3.2. Status and types of NTFPs found in Mundemba Municipality

Table 2 shows the status and types of the different NTFPs listed by the farmers. Locally *Tetracarpidium conophorum, Afrostyrax lepidophyllus,* and *Garcinamannii* were noticed to be rare. Probably this could be due to deforestation, over exploitation and settlement encroachment into fragile habitats. This is in line with [13], who agreed that deforestation and settlement encroachment fragment vital habitats for most plant species rendering them rare or extinct. Based on the IUCN red list categories (*Pipper*spp, *Tetracarpidium conophorum, Cola acuminata, Cola lepidota, Ricinodendron heudelotii* and *Mucuna sloanei*) were noticed as least concerned. This may be due to the fact that most of the farmers spared most of these species during clearing or during felling. Also, observed that most of these NTFPs species farmers have developed techniques in domestication. This finding corroborates with works of [19], who mentioned that sustainable practices leads to improve production and better marketing.

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3.3. Challenges of production and marketing of NTFPs in Mundemba

As shown in table 3 the main challenges noticed for production were limited land, limited knowledge of farm techniques, poor planting material. This may be due to the fact most of the land are inherited from generation to generation. Most women are left out during the sharing of inheritance. Secondly since women do not directly inherited land and majority of women are into NTFPs production and gathering could have resulted into this constraint. The limited knowledge noticed to be a major problem could be reflected in their low level of literacy. It was noticed that most of the farmers had just finished basic education. This finding is in agreement with the work of [38], who reported that the literacy level of the farmers counts on his or her general output.

Another challenge shown on table 3 under production was intensive labour. Probably, this may be due to the small size of the household. In rural settings children are noticed as family source of labour. [36], revealed in their work that children play a major role in NTFPs gathering and collection. The main marketing challenge reported was insecurity (goods) with a percentage of 39 % .Probably most of the farmers were on able to determine the production at each year and the market cost. Secondly most of the buyers do not keep to their words as buyers fluctuates prices of the NTFPs depending on the demand in local and international markets. [39], also confirmed that seasonal fluctuation hampered production and marketing of NTFPs. Also lack of storage and drying facilities were also noted as processing challenges associated with NTFPs production and marketing. Most of the fresh NTFPs got rotten before they are transformed. [31], mentioned that if these products are not transformed or value added most of the NTFPs gets rotten and brings low income to the farmers.

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3.4. Mitigation strategies and techniques

Despite these constraints, the indigenous people succeeded in handling the different challenges. They had expectations which can better solve these major constraints, thus improving on their NTFPs cultivation, exploitations and marketing. They expected the government to provide the communities with farm inputs such as fast growth NTFPs, send extension works to build on their capacities on production, transformation and marketing. Communities have placed restricted laws of indiscriminate forest clearance, farmers formed small common initiative groups to share experiences and sale of produce. Farmers have learned to spare NTFPs in their farms and to domesticate most of the wild species in their farms. [2], mentioned that all the parties: government, communities and the farmers should play major role in the mitigation of the different constraints.

4. CONCLUSION

NTFPs gathering, collection and marketing plays a paramount role in poor rural communities as it acts as safety nets in periods of lack. The part they play in rural subsistence and income generation cannot be left on mentioned in forest dwelling communities [2]. The production, processing and marketing are essential elements in improving livelihood standards for most forest dwellers. This study has revealed that both male and female are involved in the production, processing and marketing of NTFPs and these products helped in supplementing their diets, fetching off seasons jobs, providing new opportunities in value added products as well as playing a major role in forest conservation and management. Despite these advantages offered by these NTFPs this study revealed major constraints in these sectors of production, processing and marketing of NTFPs. These constraints are categorised into production aspects such as limited land, limited knowledge on farm techniques and poor planting materials. In

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respect to processing the main constraints noticed were poor storage, storage facilities and limited processing units. In the aspects of gathering of NTFPs the major challenges were long distances in the collection of the goods, intensive labour, poor farm roads and poor harvesting techniques. Finally, the main marketing constraints were low prices, poor farm to market roads, insecurity and failure for buyers to keep to time. However, this study revealed the main mitigation techniques of the different stakeholder as government to construct good roads, provision of improve farm inputs and regularise fluctuating prices for NTFPs. In respect to the communities to fix farm to market roads, ensure laws to reduce indiscriminate harvesting and encourage domestication of NTFPs. For farmers spare most of the NTFPs on their farms during clearing, domestication of species and build their capacity on production and marketing of NTFPs.

Therefore, proper management will definitely leads to improve production and marketing of NTFP and will lead to improvement of livelihoods amongst forest dwelling communities.

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