

AN ASSESSMENT OF FOREST PROTECTION PROGRAMMES AND ACTIVITIES AMONG RURAL WOMEN IN MICHIKA LOCAL GOVERNMENT AREA

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Abstract

Women in developing countries have direct contact with the natural environment as they collect essential items for their everyday needs. There are also women consumers and or purchasers who have indirect link with the forest. As consumers, producers, and caretakers of their families and educators, women play important roles in promoting sustainable development through their concerns for the quality and sustainability of life for present and future generations. This study identified indicators of forest degradation, assessed forest protection programmes and policies among women in Michika local government of Adamawa state. Questionnaires and oral interview and focus group discussions were used in collecting data for the study. The collected data were analyzed using descriptive statistics and the results presented in tables. The result identified the indicators of forest degradation in the area to include; Decrease in products flow, Decrease in forest/canopy cover, Disappearance biodiversity/species, Erosion and Dominant of invasive species in Michika. The results of the focus group discussion indicates that women in the study area practice some form of forest protections programs and policies such as discourage clandestine cutting of tree species, sustainable forest development, land-use planning and infrastructural design. Thus, the study recommends involvement of women in community forest protection and Formation of Community-Based Forest Management (CBFM) among others.

Key Words: Forest, Protection, Rural, Women, Program, Michika

Introduction

According to the Clean Development Mechanism (CDM) of the Kyoto protocol, a “forest” is an area of more than 0.5-1.0 ha with a minimum “tree” crown cover of 10-30%, with “tree” defined as a plant with the capability of growing to be more than 2-5m tall (UNFCCC, 2020). Community forest is a tree growing and production-oriented activity conducted

with the purpose of providing forest-based products for the direct benefit of the local community that takes part in the activity Basu (2015). The basic framework of the community forestry programme is that any local community, through its active involvement and participation in a forest production activity, is able to benefit directly from the products that are made available. The broad objectives of the

community forestry are to satisfy the basic needs for forest products of local communities, to improve people's standard of living by making certain forest products more easily available and to introduce wide environmental benefits (Dida, 2016).

Forests over history have value to the world's human population and their values are by each day increasing as people still use forest to protect themselves, for shelter and for fuel wood. According to Mishra *et al.* (2020) raw material for wood processing industry that forest provides habitat for wildlife, reserves for water and soil conservation, oxygen and food chain. However, our forests are facing so many problems. Most of the world's vegetations are in a constant state of flux at a variety of spatial and temporal scales, deforestation of our tropical forest is as a result of many pressures (Lambin, 2018). As people try to meet their daily needs, they subject forest, woodland and grassland to the highest rate of change (Peters, 2019). Also as noted by Tsagaye (2019), our forest today faces all sorts of anthropogenic activities, such as, illegal felling of trees for firewood and roofing, illegal cultivation and conversion of parts of the forest for residential by nomads.

Degradation of forest ecosystems is a reality throughout the tropics and sub-tropical regions of the world. This has led to a significant reduction in goods and services provided by forests and has negative consequences for rural communities. According to results obtained from studies on forest degradation in South-Asia, a total of 53 million ha of existing forest requires investments into forest rehabilitation (Basu, 2015). The tropical rain forests of South-western and South-eastern states of

Nigeria are no exception and over many decades have been subjected to heavy exploitation and over-utilization by a growing rural population.

Forest degradation which necessitated community forest protection, greatly affects social, cultural and ecological functions. It is a silent killer of sustainable development because its consequences are often subtle but become apparent only slowly (UNEP, 2016). However, the Food and Agricultural Organization (FAO), the International Tropical Timber Organization (ITTO).

At the global level, a consensus definition of forest degradation is "the reduction in the capacity of a forest to meet social and ecological objectives and needs" (Koopmans, 2015). Degradation occurs when forests remain forests but lose their ability to provide ecosystem services or suffer major changes in species composition due to over exploitation, exotic species innovation, pollution, fires, or other factors. Rademaekers *et al.* (2010) and Sumit Chakravarty (2012) in similar studies on forest degradation identified some common causes or drivers of forest degradation such as Commercial logging, Illegal logging, Urbanization and infrastructure, Expansion of farming land (shifting cultivation), Charcoal production (Fuel wood consumption).

However, in the context of this study, forest degradation is defined as forest degradation only when a forest cannot longer supply or deliver the needed goods and services. In the other hand, forest degradation involves any change process that negatively affects the characteristics of a forest such that the value and production of goods and services decline. This change process can be caused by disturbance (although not all disturbances

cause degradation), which may vary in extent, severity, quality, origin and frequency. Disturbance may be natural (e.g. that is caused by fire, storm or drought), human-induced (e.g. through harvesting, road construction, shifting cultivation, hunting or grazing) or a combination of the two. Human-induced disturbance may be intentional (direct), such as that caused by logging or grazing, or it may be unintentional (indirect), such as that caused by the spread of an invasive alien species (FAO, 2017).

This study identified indicators of forest degradation and assessed forest protection programs among rural women in Michika LGA of Adamawa state

northeast Nigeria. The study also examined the effects of forest resources degradation in the study area.

Study Area

Michika Local government area of Adamawa state in Nigeria the study area lies within latitude 10° 21' N -10° 50' N and longitude 13° 10' E -13° 14' E with an elevation of about 650m above sea level. Michika Local Government Area is one of the twenty-one (21) local government areas in Adamawa State covering an area of about 1421.99km². It shares boundaries with Madagali Local Government Area in the north, Mubi to the south, Borno State to the west, and Republic of Cameroun to the east fig.1 (Janice, 2014).

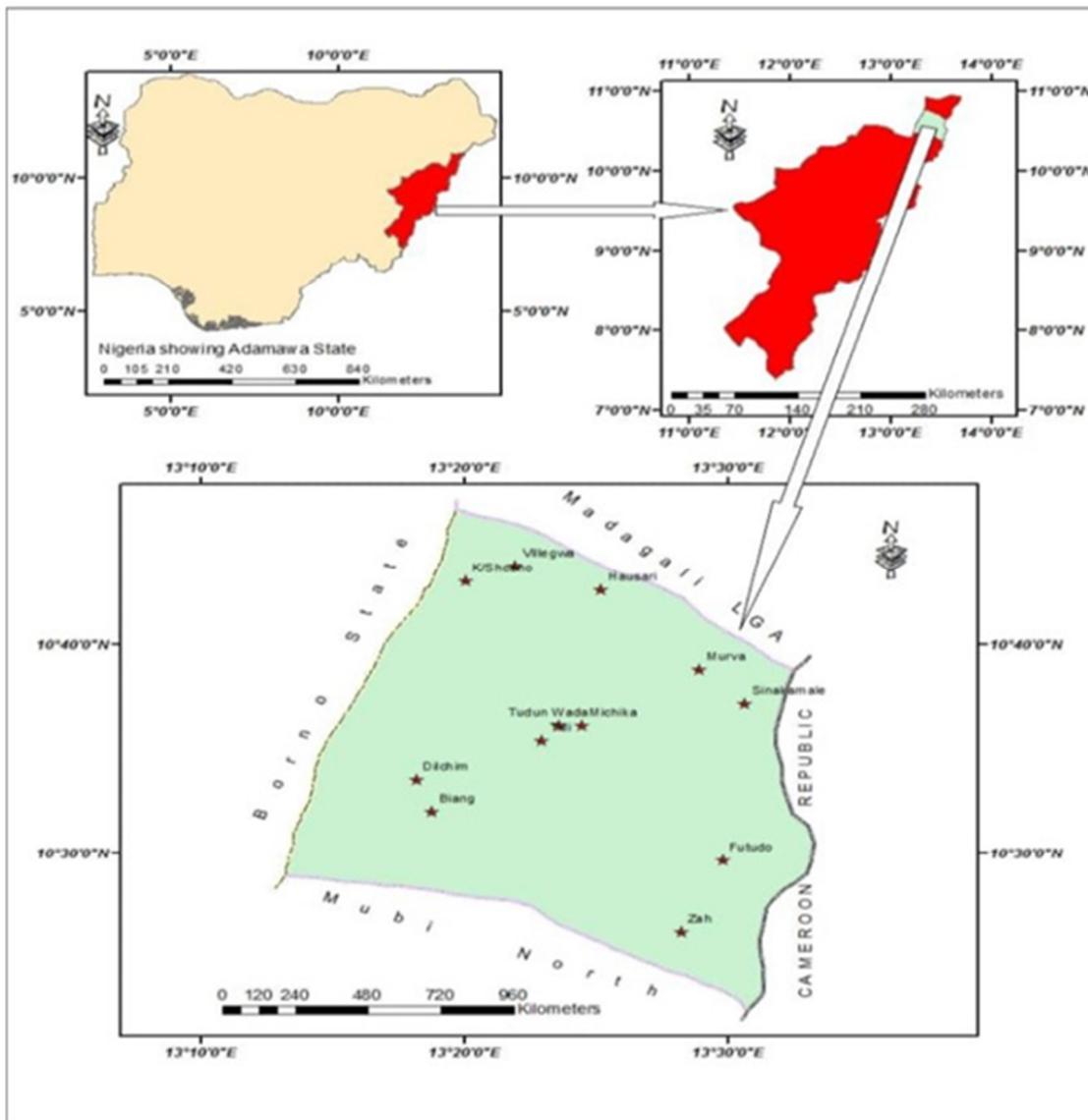


Fig. 1: Adamawa State showing Michika LG the study area
 Source: Digitized/Modified from Google Earth, 11/03/2019

The climate of Michika can be described as a relatively hot tropical climate and confines within the Tropical Continental North Climatic Region, typically of Koppens' classification. This affects the vegetation types, water quality and soils. The area has two seasons, namely dry season and wet season. The rainy season commences in May and ends in October, while the dry season begins in

November and ends in April. The average annual rainfall ranges between 650-700mm and it comes in torrential form (Abiodun, 2016). The highest rainfall is recorded in the months of July and August. The hilly parts of the area such as Visik, Za'ah, Tilli, Sinagali among others receive higher months of rainfall than the plain/lowlands covering the western parts of the area.

Like most areas of the northern parts of the state, the soils of Michika are derived from basement complex, while few other places are on sandstones shales and alluvium. Vegetations in Michika Local Government Area is typically of Sudan savanna, which is more open and supports forest and agriculture. It is, however, necessary to note that large scale deforestation resulting from indiscriminate extraction of wood for fuel and expansion of agricultural land areas have left large areas within each vegetation type with few indigenous woody plant species. Most areas, especially those close to settlements, are covered with exotic species such as the neem and eucalyptus trees.

However, the original forest types could still be found in patches in each zone particularly along the Nigerian - Cameroon borders where there has been little or no disturbance on the forest ecosystem (Carleer and Wolfe, 2014). The vegetation also relates to the soil and climate as well as anthropogenic activities. The vegetation consists of fine leaved and morry trees, especially of the *Tamarindus indica* (tamarind), *Adansonia digitata* "Mete" (Baobab) and *Faidherbia albida* "(Gawo)": Whereas *Parkia biglobosa* (locust bean) "Leghwi", *Butyrospermum parkii* (Shea-butter), *Ficus spp* (mustard trees) are mostly found on the plain land. While exotic trees such as *Mangifera indica* (mango), *Psidium guajava* (Guava), *Carica papaya* (pawpaw) and cashew grow mostly along the streams, river valleys and along the mountain creeks where water is found. Trees do not form canopy due to nature of their distribution and anthropogenic activities. The canopy covers are short and moderately thick common grass found in

Michika is the (gamba grass) *Andropogon gayanus*.

Population constitutes a vital component of the resource base and the development potential of any country. The size, rate of growth, spatial distribution, demographic structure and quality determine the direction and pattern of development. However, as given by the National Population Census conducted in 2006 with a projected population figure to 2018, Michika population was put at 219,143 persons of whom 104,456 were males while 114,688 were females with an annual growth rate of 2.83% with variation in its distribution pattern (NBS, 2007).

Methodology

Primary data were collected through the use of questionnaires, observations and oral interviews as well as Focus Group Discussion (FGD) as suggested by Hyman (2004), who suggests that this form of triangulation of data source helps in comparing and harnessing diverse ideas on the same issues. It also assists in vetting, cross-checking the outcome: and similarly, it helps to increase the validity and reliability of the results. The questionnaire was divided into four (4) segments which includes biodata of respondents, socio economic characteristics of women livelihoods, Available Forest resources in the area and forest protection programs and activities among women in the area.

Five (5) villages were sampled out of the sixteen (16) villages selected using stratified and random sampling as used by Obazee and Kayode (2012). The questionnaires were administered to the respondents of the sampled villages in a proportionate form. They were

administered to respondents who have lived in the area for more than two decades. Focus group discussions were conducted in each of the five (5) selected villages within and around the forest communities. Each group constitutes minimum of eight (8) and maximum of twelve (12) people that comprise women who resides in the area.

The study population of the area according to 2006 census data projected to 2018 source from National Bureau of Statistics of the sixteen (16) selected villages was 17,021 out of which the women constitute 9,525. A sample size of 489 respondents using a marginal error of 5% adopted from Saunders (1997) was employed to represent the population of women in Michika Local Government Area of Adamawa State. Proportionality factor was used to select 489 respondents from Michika LGA based on their population size. The proportionality factor adopted is;

$$Q_i = (F_i/P) \times N$$

Where:

Q_i = The number of respondents selected from each village.

F = Population of each village.

P = The total population of the five villages.

N = Required total sample size

Simple systematic random sampling technique was used to select the

respondents from each village for the distribution of the questionnaire. Each member of the population was numbered 1 to N , from the 489 population sample size adopted from Saunders (1997). A starting point on the random table was selected. Up to down read direction was chosen for selecting the sample population of 489. Sample were selected in such a way that all the members of the population have equal chances of being selected by the use of table of random numbers to select the respondents for the distribution of questionnaires (Udofia, 2019). Thus, villages that are most susceptible to forest degradation and where protection of the community forests programs exist constitute the total of the sample selected these includes Villegwa, Murva, Sina Kamale, Futu Do and Biang (Figure 2). As opined by Promode (2008) "sample sizes larger than 30 and less than 500 are appropriate for most research". Bearing in mind these limitations, the sample size of 489 respondents was designed for the residents.

Descriptive statistics tools were used to analyze the quantitative data through the help of Statistical Packages for Social Sciences (SPSS) version 21. The data collected were summarized in forms of tables, frequencies and then analyzed and presented in charts and graphs.

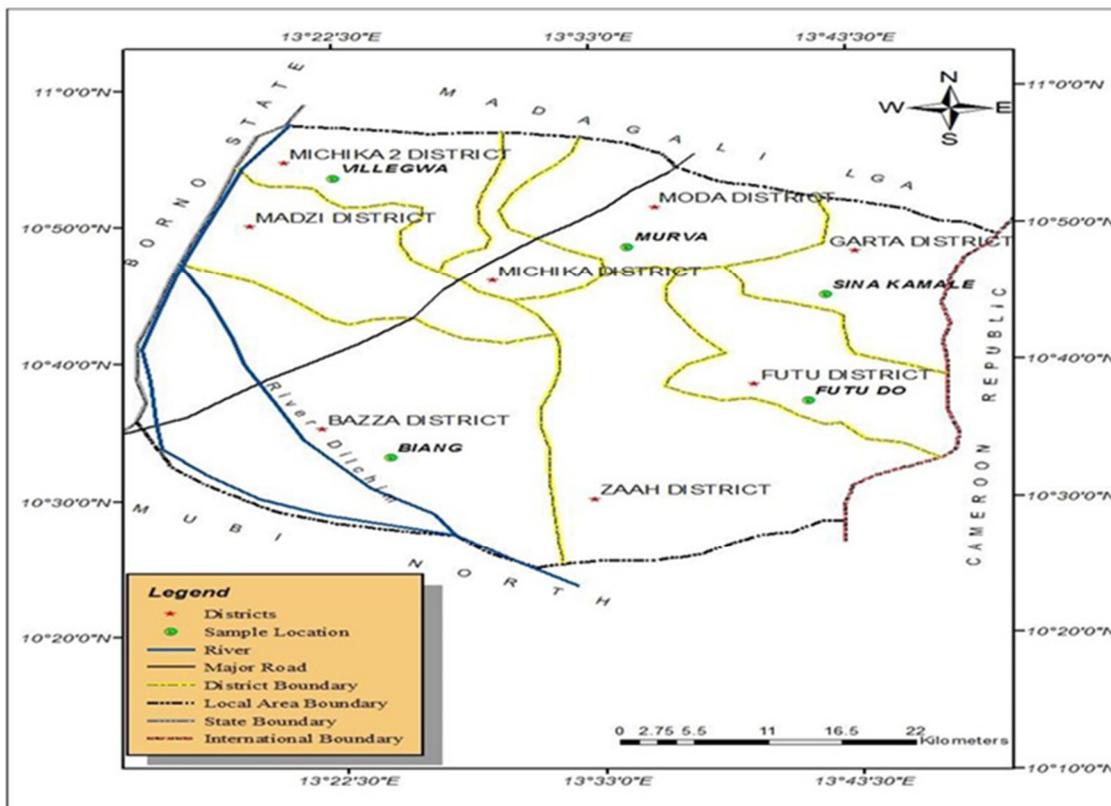


Fig. 2: Michika Local Government Area depicting sampled villages used
 Source: Digitized/Modified from Google Earth, 2019

Results

Socio Economic Characteristics of the Respondents

Age distributions of the respondents

Majority of the respondents, (74%) fall within the age group 36 – 65 years, table 1. The average age of the respondents was 48 years. This implied that the respondents were within the active and economic age bracket of between 30 – 60 years. The results agreed with the findings of Saha and Guru (2013) that the mean age of women in Nigeria was between 45 – 48 years. On the contrary, the result of this study argued with the finding of Ajakpo

(2015) who assert that the average age of active women in Ethiopia is between 36 – 40 years. Nevertheless, this clearly shows that, majority of the population constitutes active age, which is a better indication of proper usage of the community forest (considering their income level that most of the active population are in the working-class category while the aged and inactive percent are in their retirement stage). In addition, majority of the women used the forest resources for medicinal and food/spices which are mostly exploited by the active age group 36-51 years.

Table 1: Age Distributions and used of Forest Resources

Age	Medical	Food/ spices	Logging/ fuelwood	Furniture/ roof	Tye/dye	Total
36-50	92	47	1	2	5	147
51-65	127	48	0	8	6	189
66-80	64		29	3	2	
Above 80 years	9	7	0	1	2	19
Total	292	131	3 0	14	15	455

From the findings the age variation within and between 36 – 65 years amidst the five villages is higher at Sina Kamale which constitutes the active population whereas Villegwa records large proportion of the dependent population, meaning those aged between 60 – 80 years and above. By implication, the consumption rate of forest resources will be more at Villegwa than the rest of the other villages considering the large number of dependents that is, old age group that do not have one form of substitutes or the other.

Gender, Non-Timber Resources and marital Status of respondents

The result as presented in table 2 implied that, forest utilization in the study

area is still primarily female dominated especially at Villegwa with higher number of forest users whereas, Biang indicates lower number of forest resource users with less effects on forest land and utilization. This is due to the cultural and religious pedigree of most African communities that still put women’s enterprise in the fore front. The result agreed with the study of Salami and Balogun (2014) in their study on the effects of forest land and utilization on environmental degradation in arid and semi – arid Nigeria who affirm that 99 percent of the respondents were female. These high percentage are those who depend mostly on the forest resources for their livelihood necessities, such as food, clothing and shelter.

Table 2: Benefits Derived by Women from Non-Timber Forest Resources (NTFRs)

Gender	Medical	Food/spices	Logging/ fuelwood	Furniture/ roofing	Tye/dye	Total
Female	292	131	3	14	15	445
Total	292	131	3	14	15	455

Marital Status of the Respondents and Non-Timber Resources

The result of marital status showed that majority of the respondents are married especially at Sina Kamale with higher proportion while Biang has lower value amidst rest other villages. This implied that a high proportion of respondents have family responsibilities. Also, it was revealed that the non-timber forest resources (leaves, roots, tree barks, flowers etc) were mostly consumed by

the married sect of the population. The result of this study corroborated the work of Saha and Sundriyal (2012) in rural Nigeria that about 75 percent of women foresters were married. The result also agreed with the findings of Atrayee and Chowdhury (2013) on the socio – economic analysis of rice farming in Ibadan, Oyo State, Nigeria, which claim that majority (80 percent) of the respondents were married (Table 3).

Table 3: marital Status of the Respondents

Marital Status	Medical	Food/spices	Logging/fwd	Furniture/rfg	Tye/dye	Total
Single	2	0	0	0	0	2
Married	152	63	3	8	9	235
Divorce	93	44	0	4	3	144
Separated	45	24	0	2	3	74
Total	292	131	3	14	15	455

Educational Status of the Respondents and Non-Timber Resources

In terms of educational status, the results indicated that a higher percentage of them had formal education at varying levels between the five villages with higher number of primary school education at Sina Kamale 24(22%), secondary education at Biang (35%) and tertiary education at Villegwa 36(32%). While remaining lower percent have non – formal education. The result implied that, women in the study area attempted secondary education or its equivalent. The result also proved that most of the women in the study area can read and write in English language, as it is observed among rural women in Oyo State, Nigeria by Salami and Balogun (2014). Thus, better educated residents or households with access to government or farmer-farmer

extension services are better adopters of forestry and less affected Muneer (2008); either because of the view of forest protection as a means of improving the land ICS (2012) or because they are able to appreciate other non-quantifiable benefits (ambiance, micro-climate modification or carbon sequestration). However, even the lower percent without any form of education may not be ruled out in having the knowledge of the impact of forest degradation and protection of the community forest. These lower percents are the most heat and affected by forest degradation and community forest protection. This is due to their frequent visits or closeness to the forest and are without any form of substitutes as such consume or depend heavily on forest resources for their livelihood’s sustenance (Table 4).

Table 4: Benefits Derived by Different Educational levels from Non-Timber Forest Resources (NTFRs)

Educational Qualification	Medical	Food/spices	Logging/fwd	Furniture/rfg	Tye/dye	Total
No schooling	73	27	0	7	3	110
Quranic education	54	30	0	2	3	89
Primary school	43	21	2	2	0	68
Secondary school	55	21	0	1	2	79
Tertiary education	67	32	1	2	7	109
Total	292	131	3	14	15	445

Based on the occupation of the respondents, the results of the findings also revealed that some lower percent of the respondents were civil servants,

business women or students who may have one form of substitutes or the other, and are less depended on forest resources while higher percent are farmer’s

categories 239(53%) with the highest number at Sina Kamale 62(56%) out of the five villages. This result agreed with the study of Amaza *et al.* (2007), which reveal that farming is the main stay of the population's economy and are subsistence farmers; where agriculture employs the larger percentage of the working population (80%) in the area. These groups of respondents, who mostly are farmers due to their daily activities, frequent visit to the forest, closeness and

levels of exposure to environmental variations, consumes more of forest resources and are likely to be affected by the effects of forest degradation and protection of the community forest on women's livelihood. This is because, the study indicated that majority of these women are closer to the environment or forest resources than the remaining 0.2% who are into one form of occupation or another (Table 5).

Table 5: Occupation of respondents

Occupation	Medicinal	Food/spices	Logging/fwd	Furniture/roofing	Tye/dye	Total
Farmer	158	65	1	7	8	239
Civil servant	49	23	1	1	2	76
Business	84	42	1	6	5	138
Student	1	0	0	0	0	1
Others	0	1	0	0	0	1
Total	292	131	3	14	15	455

Collection of Non – Timber Forest Products (NTFPs)

Several forest products like leaves, fruits, tree barks, roots, stems, and flowers, are collected from the forest as non-timber forest products (NTFPS). Uses for which forest products are collected include raw materials such as grass, fibre/ropes for locally produced goods, leaves/fodder for animal and medicine, and fruits for food.

The findings of this study as presented in table 6. & 7 revealed that a large proportion of women at Biang village use

bark of trees and fruits/seeds for medicinal, food and spices. The reasons are because of the availability of fruits/seeds as well as bark of trees in the area prompt such uses while small proportion of these women engaged bulbs/rhizomes for food/spices. Unlike Biang village, large proportion of women at Murva use both leaves and flowers for medicinal, food and spices. The availability of these resources prompts the use in treating typhoid fever, stomach ache, and ulcer among others.

Table 6: Women Livelihoods Dependence on Forest Resources

Forest Resource Exploited		Community Benefits of Forest Resources				
	Biang	Murva	Futu Do	Sina Kamale	Villegwa	Mode
Leaves	48	50	59	72	70	299
Roots	49	49	40	54	64	256
Fruits/Seeds	50	48	39	48	47	232
Bark of Trees	50	36	40	49	38	213
Stems/Branches	42	27	33	42	40	184
Flowers	36	50	36	41	33	196
Bulbs/Rhizomes	27	42	23	34	54	180
Latex/Resins	41	41	41	34	53	210
Total/No of Respondents	58	86	88	110	113	455

On the other hand, only few of the women use tree branches and stems for fuel wood. The inability to afford kerosene, gas cookers, contributed to such use as substitutes, hence availability of tree branches and stems in the area. The study shows that the use of these products can affect normal forest functions in terms of transpiration, decreased in fruits flow, and plants death in the long run. Majority of the respondents as shown in table 6 attested to the use of leaves for medicinal, followed by latex/resins use in furniture, then roots, bark of trees as well as bulbs/ rhizomes

used for medicinal. The reasons are due to seasonal variations in the supply and availability of these forest resources. In a similar vein, leaves, roots, fruits, bark of trees and stems are mostly used by women at Sini Kamale as medicinal while smaller number use bulbs/rhizomes for food and spices. Here the resources are in abundant supply and more easily accessible to the women. This result, agreed with the findings of World Bank, (2014) that more than 1.6 billion people around the world depend on varying degrees on forests for their livelihoods.

Table 7: Community Derived Benefits from Non – Timber Forest Resources (NTFR)

Villages	NTFRs	Medicinal	Food/Spices	Fuel wood	Thatching/Fencing	Furniture		
Biang	Leaves	48	0	0	0	62	0	
Murva		50	48	0	0	0	0	
Futu Do		59	0	0	0	30	0	
S/Kamale		72	0	0	0	0	0	
Villegwa		70	42	0	0	0	0	
Total		299	90	0	0	82	0	
Biang	Roots	49	0	0	0	0	0	
Murva		49	0	0	0	0	0	
Futu Do		40	0	0	0	0	0	
S/Kamale		54	0	0	0	0	0	
Villegwa		64	64	0	0	0	0	
Total		256	64	0	0	0	0	
Biang	Fruits/Seeds	0	50	0	0	0	0	
Murva		48	0	0	0	0	0	
Futu Do		0	39	0	0	0	0	
S/Kamale		48	0	0	0	0	0	
Villegwa		47	0	0	0	0	0	
Total		143	89	0	0	0	0	
Biang	Bark of Trees	50	0	0	0	0	0	
Murva		36	0	0	0	0	0	
Futu Do		40	0	0	0	0	0	
S/Kamale		49	0	0	0	0	0	
Villegwa		38	0	0	0	0	0	
Total		213	0	0	0	0	0	
Biang	Stems/Branches	42	0	0	0	0	0	
Murva		0	0	27	0	0	0	
Futu Do		0	33	0	0	0	0	
S/Kamale		42	0	0	0	0	0	
Villegwa		40	0	0	0	0	0	
Total		124	33	27	0	0	0	
Biang	Flowers	0	36	0	0	0	0	
Murva		0	50	0	0	0	0	
Futu Do		0	36	0	0	0	0	
S/Kamale		41	40	0	0	0	0	
Villegwa		0	33	0	0	0	0	
Total		41	195	0	0	0	0	
Biang	Bulbs/Rhizomes	10	27	0	0	0	0	
Murva		0	42	0	0	0	0	
Futu Do		23	28	0	0	0	0	
S/Kamale		0	34	0	0	0	0	
Villegwa		12	54	0	0	0	0	
Total		45	185	0	0	0	0	
Biang	Latex/Resins	0	0	0	0	0	41	
Murva		0	0	0	0	0	41	
Futu Do		0	0	0	0	0	41	
S/Kamale		0	0	0	0	0	54	
Villegwa		0	0	0	0	0	53	
Total		0	0	0	0	0	230	
Total	1121		656		27	82		230

Forest Protection Programs and Activities Among Women

The findings from this research as presented in table 8 indicate that the best way to mitigate and cope with the challenges of forest degradation/vegetation loss is to discourage clandestine cutting of tree species with 47.3%, then adapting to

climate change impacts or promoting adaptive capacity with 17.8%. Another adaptive strategy to cope with the challenges is through sustainable development that can reduce vulnerability to climate change with 16.0%. Similarly, adaptation measures in land-use planning and infrastructural design enhance adaptive capacity and increasing

resilience with 9.9% and 9.0% respectively, table 8. Hence, the result agrees with the statement which indicates that, a considerable difference was found on the opinion that women need to be fully incorporated in forests protection and management policy and practices. This shows that majority of women had not been fully incorporated in forests protection. This also exerts negative

impacts on the women. Therefore, for a conservation program within a community forest to succeed, women involvement is imperative (Agarwal, 2011). Provision of education to their children and other skill development training to youths will enable these forest dependent populations to diversify their livelihood options and look beyond forest as their sole source of income.

Table 8: The adaptive strategies to cope with the challenges of forest degradation/vegetation loss

	Villages	Biang	Murva	Futo Do	Sina kamale	Villegwa	Total
Variables							
By Enhancing Adaptive Capacity and Increasing Resilience	Count	9	3	12	13	4	41
	% within	15.5%	3.5%	13.6%	11.8%	3.5%	9.0%
By Adapting to Climate Change Impacts or Promoting Adaptive Capacity	Count	23	8	14	22	14	81
	% within	39.7%	9.3%	15.9%	20.0%	12.4%	17.8%
Through Sustainable Development That Can Reduce Vulnerability To Climate Change	Count	9	17	8	16	23	73
	% within	15.5%	19.8%	9.1%	14.5%	20.4%	16.0%
Through Adaptation Measures in Land-Use Planning and Infrastructure Design	Count	3	8	10	8	16	45
	% within	5.2%	9.3%	11.4%	7.3%	14.2%	9.9%
By Discouraging Clandestine Cutting of Tree Species	Count	14	50	44	51	56	215
	% within	24.1%	58.1%	50.0%	46.4%	49.6%	47.3%
Total	Count	58	86	88	110	113	455
	% within	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Provision of infrastructure and support for improved agricultural practices as well as other natural resource-based activities like apiculture would ensure better income to these poor households. Forests provide a range of marketable NTFPs like fruits, flowers, berries, tubers, resins, honey, leaves, creepers etc. that have great nutritional, medicinal, and other values. However, many of these products fetch a good price in cities and markets but the

collectors (the forest dependent) sale these to the intermediaries at abysmally lower prices. The support for marketing and value addition by creating processing facilities would not only improve their income but also the employment opportunities in these hinterlands. Approximately, NTFP sector with an annual growth rate between 5 and 15%, also contributes up to 75% of forest sector income.

The result of the cross tabulation (Table 9) indicate that Biang village relies more on adapting to climate change impacts through promoting adaptive capacity to cope with forest degradation/degraded forest while the remaining four villages adopt discouraging

clandestine cutting of tree species to cope with the menace of forest degradation/degraded forest. This, therefore, means that there is a significant relationship between the villages and their adaptive strategies.

Table 9: A cross tabulation of villages and the adaptive strategies to cope with forest degradation/degraded forest

Villages	By enhancing adaptive capacity and increasing resilience	By adapting to climate change impacts/promoting adaptive capacity	Through sustainable development that can reduce vulnerability to climate change	Through adaptation measures in land-use planning and infrastructural design	By discouraging clandestine cutting of tree species	Total
Biang	9	23	9	3	14	58
Murva	3	8	17	8	50	86
Futo Do	12	14	8	10	44	88
Sina Kamale	13	22	16	8	51	110
Villegwa	4	14	23	16	56	113
Total	41	81	73	45	215	455

Also, extension contact positively and significantly influenced investment in forestry, irrigation at 1%, positively and significantly related to forest improvement at 5% significance and extension contact is positively related to tree planting and large-scale farming but not significant. This implied that more contact with extension services increased the probability of investment in forestry and irrigation respectively. This suggested that substantial effort was made by extension officers in providing necessary advisory services to the women on appropriate use of various forest management practices and investing to boost forest production and to sustain the environment. This similar to finding of Simon (2019) in Ghana where access to extension services was found to disseminate proper information on cocoa production technologies and management practices among women foresters. Membership of forest-based management took a positive sign in all the areas of adaptation and was significant at even 1% level in forest improvement.

Conclusion and Recommendations

This study revealed the main activities in the forests and demonstrates the impact of these activities on forest resources by looking at the socio economic characteristics of women livelihoods, available forest resources in the area, indicators of forest degradations and forest protection programs and activities among women in the area. Based on the results of this study, it can be concluded that forest resources in the study area has been degraded and livelihood of women in the study area has been affected by the impacts of the forest degradation. As such, rural women in the study area have adopted various programs and policies of protecting the forest in the study area.

The following recommendations were made;

- i. Formation of Community-Based Forest Management (CBFM)
- ii. Provision of education to women and skill development trainings to youth to enable these forest dependent populations to diversify their

livelihood options and look beyond forest as their sole source of income.

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