

Exploring the role of forests as natural assets in rural livelihoods and coping strategies against risks and shocks in Dedza east, Malawi

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ABSTRACT

Forests are important natural capital for forest-adjacent communities and play an important role in dealing with risks and shocks. The study therefore examined the roles of forests in rural livelihoods in Dedza district eastern Malawi with focus on basic needs and assets, shocks and coping strategies. The findings showed that efforts were made by the co-management program in the study area to increase the livelihood capitals of the people, but the extent could not be ascertained. There were gaps in meeting basic needs of the households with forest products playing an insignificant role in both livelihood and coping strategies. The forest mainly supports subsistence needs with negligible contribution toward provision of safety net and as a pathway out of poverty. The main livelihood strategies were farm based, wage based and diversified. The prominent shocks that the households faced were serious crop failure and serious illness. Casual work, sale of agricultural products and reducing consumption constituted the prominent coping strategies of the people. The study further showed that land-holding size and age are the main determinants of livelihood diversification. Longitudinal data collection is, therefore, recommended to investigate further the nature of contribution of forests to livelihood diversification at household level.

Key words: livelihood assets, livelihood strategies, risks, shocks, coping strategies, forest products, co-management

INTRODUCTION

Forestry in Malawi is ranked second to crop production on the sectors that make a significant contribution to the economy of rural households (IFMSLP, 2007; Kayambazinthu & Locke, 2004; Lowore, 2006; Sibale & Banda, 2004). Forests provide domestic products and meet a range of basic needs, such as firewood, fiber, thatch grass, timber and poles, bush meat, caterpillars, herbs, fruits, and spiritual services. Forests also provide a range of food types which can be categorized into four groups: famine foods, foods to vary diet, fodder for livestock, and foods for sale (Lowore, 2006). Limitations to government health services have contributed to rural people's reliance on forests as a source of medicine whose healing properties are closely tied to cultural beliefs (Ngulube, 2000). Furthermore, charcoal trade in the country is the largest and most integrated forest product valued at around US\$8 m (Chirwa et al., 2008; Lowore, 2006), while Kambewa et al. (2007) estimated it at USD 40 million.

Malawi's forestry resources include forests reserves, national parks and wildlife reserves, plantations, and forests on customary land. The first three resources were set aside to conserve the environment and biodiversity, and to provide refuge for wildlife and therefore, exploitation was restricted until now. The forestry resources are dwindling and being exploited unsustainably largely by the poor who rely on them for survival, by conversion to agricultural land, and over-dependence (96.8% of the population) on firewood and charcoal as the primary energy source for cooking (Eneya & Saka, 2007; Yaron et al., 2011; Zulu, 2010, 2013). Despite national action programmes in forest conservation, there has been an estimated net losses of 8.4% (4.39–3.39 million ha) of woodland in Malawi between 1999 and 2018 (Gondwe et al., 2020). Meanwhile FAO indicates that Malawi experienced an aggregated 1.6% of forest loss between 1990 and 2010 (Coutts et al., 2019; FAO, 2013, 2015). Introduction of participatory forest management (PFM) in Malawi, specifically co-management, as a management regime was aimed at improving access to forest resources in a sustainable manner. This process was supported by development of management plans with strategies to achieve livelihood outcomes such as increased income.

The Improved Forest Management for Sustainable Management Programme (IFMSLP) was a two-phased (2006–2009 and 2011–2013) donor-funded participatory forestry programme, which was implemented in 12 districts of Malawi, four in each of the three regions. The aim of the programme was to address poverty and enhance rural livelihoods through increased community involvement in forest management. This was to be achieved by ensuring security of access to and control of forest resources, by communities to meet their basic needs, reduce vulnerability and create income-generating opportunities (IFMSLP, 2007). At the onset of IFMSLP, a sustainable livelihood analysis (SLA) exercise was carried out, among other things, to identify levels at which basic needs were being met. As an output for this exercise, an action plan was prepared to address gaps that were identified. The programme activities included co-management, community-based forest management, and promotion of forest-based enterprises (FBEs). Implementation of these activities necessitated the adoption of a collective approach that required the communities to create multi-level local forest organizations (LFOs) for effective management of the forest resources. These LFOs included product specific forest user groups (FUGs) at household/individual level with focus on entrepreneurship; elected village natural resource management committees (VNRMCs) whose role was to lead community-based forest management activities in designated village forest areas (VFAs); an elected multi-village block management committee (BMC) to lead co-management activities; and at district level a multi-stakeholder local forest management board (LFMB) to provide district level monitoring and coordinate reserve management across blocks (Zulu, 2013). This process was formalized through signing of the co-management agreement between government (represented by department of forestry) and the communities (represented by the block management committee).

CONCEPTUAL FRAMEWORK

This research applied the sustainable livelihood (SL) framework described by Scoones (1998) and DFID (1999) in analyzing the impact of PFM on rural livelihoods because it assists in understanding the nature of the relationships between people and the ways in which they draw upon forest outputs in their livelihood systems. A livelihood comprises the capabilities, assets (including material and social resources) and activities required for a means of living (DFID, 1999; Scoones, 1998). The five types of capitals/assets that people draw upon to build livelihoods include human, social, natural, physical and financial capital (Carney, 2002; DFID,

1999; Scoones, 1998). The livelihood strategies determine the assets that a household accumulates (Hatlebakk, 2012).

When responding to shocks, households deploy their assets in different combinations to meet livelihood goals. In terms of the link between SL assets categories and the basic framework in forestry, productivity is influenced by physical, financial, natural and human capital whilst social capital influences access to (and availability of) forest products and livelihood outcomes (Figure 1). This process is determined by the (Forestry) policy and institutional framework (Department of Forestry, Local Forestry Organizations (LFOs)).

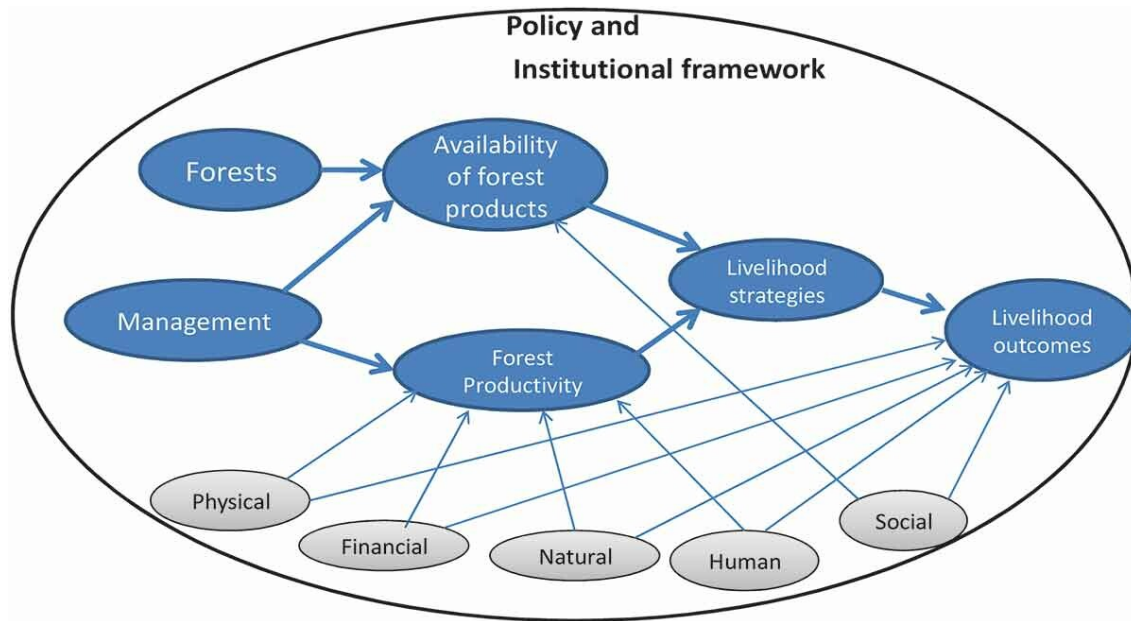


Figure 1. Links between forests and livelihoods.

Adato and Meinzen-Dick (2002) defined livelihood strategies as ‘*the choices that people employ in pursuit of income, security, wellbeing, and other productive and reproductive goals*’. Households draw on a range of assets to diversify livelihood strategies and this is the norm for rural households in sub-Saharan Africa (Babulo et al., 2008; Tesfaye et al., 2011), both as a coping and adaptation mechanism to vulnerability and poverty (Ellis, 2000; Hatlebakk, 2012). Diversification is defined as ‘a continuous process by which households maintain and adapt to a diverse portfolio of activities for survival and improved standard of living’ (Ellis, 1998, 2000). Various motives prompt households to diversify. These include risk reduction, response to diminishing returns, reaction to crisis, high transaction costs, realizing strategic complementarities and gaining comparative advantage with superior technologies, skills or endowments (Barret et al., 2001). Examples of risks and shocks that households face include crop failure, illness, death of a productive adult, price fluctuations, livestock disease and death, drought and floods (Cavendish, 2003; McSweeney, 2004, 2005; Takasaki et al., 2004). Regardless of the reasons, livelihood diversification is determined by household endowments such as land, household size, age and education attainment (Barret et al., 2001; Hatlebakk, 2012) and exogenous factors such as incomplete markets for land, labor, credit or insurance.

Forests are important natural capital for forest-adjacent communities. Management and utilization of forest resources that involves communities, provides them with access to goods and services that are used in their livelihood strategies (Duguma et al., 2018). Forest products are used to support current consumption; as a safety net during crisis; and as a way out of poverty (Angelsen & Wunder, 2003; Cavendish, 2003; Djoudi et al., 2015; Porro et al., 2015; Shimizu, 2006). The importance of these products, both timber and non-timber, in people's livelihoods has been widely documented. In terms of risks, forests are a common safety net and provide resources for seasonal gap filling (World Bank, 2013; Wunder et al., 2014).

Several researchers have applied the sustainable livelihood approach (SLA) to forest-livelihood linkages and poverty reduction (Ali et al., 2007; Babulo et al., 2008; Kamanga et al., 2009; Mazur & Stakhanov, 2008; Shimizu, 2006; Tesfaye et al., 2011; Zenteno et al., 2013). However, very few (Chilongo, 2014; Jumbe & Angelsen, 2006) have examined the livelihood strategies of households and the role of forest resources and income in achieving livelihood outcomes under co-management of forest resources in Malawi. This research therefore examined how forests are linked to households' livelihood strategies. Specifically, the study addressed the following research questions: (i) to what extent are households' basic needs met? (ii) What assets do households have access to in pursuant of their livelihoods? (iii) What are the main shocks (both negative and positive shocks) that households face? (iv) What coping strategies are adopted against risks and shocks? In this study, positive shocks refer to an unexpected receipt of money from outside the household.

METHODOLOGY

Study area description

Malawi is a small southern African country with a population of approximately 17.5 million people (National Statistical Office, 2018), 50.7% of which live below the poverty line (2010 est.). The gross domestic product (GDP) per capita is 1,200 USD (2017 est.) (CIA World Factbook, 2019). The economy of Malawi as well as livelihoods of Malawians is heavily dependent on agriculture (FAO, 2013). The majority of the population (84%) live in the rural area where income generation opportunities are low. The land holding size per household is small (0.5–2 ha) as such the people extract natural resources in their immediate environment for daily household use and income generation (Coutts et al., 2019).

The research was conducted in the Dedza district, involving eleven villages adjacent to Mua-Livulezi Forest Reserve. The Forest Reserve (FR) was one of the co-management sites for the Improved Forest Management for Sustainable Livelihood Program (IFMSLP). Mua-Livulezi FR (Figure 2) was gazetted in 1924 to act as a water catchment area and for its cultural value to the adjacent communities (Department of Forestry, 2007). The reserve covers an area of 12,147 hectares and lies within the Kirk Range Escarpment, at an altitude of 2000 m above sea level, receiving 1600 mm of rain per year. The vegetation is characterized by relics of evergreen forests and fire induced montane grassland on top, and miombo woodlands on the plateau, along the slopes and valley bottom. The most common species are *Pterocarpus angolensis*, *Khaya anthotheca*, and *Breonadia salicina* with dense undergrowth of bamboos. The soils can broadly be classified as ferralitic latosols (Department of Forestry, 2007). Recently, the reserve has experienced a lot of degradation because of encroachment, illegal pit sawing, charcoal production, and late bushfires (GoM, 2013). This is attributed to improved accessibility to Dedza town because of the construction of a tarmac road, which passes through the reserve.

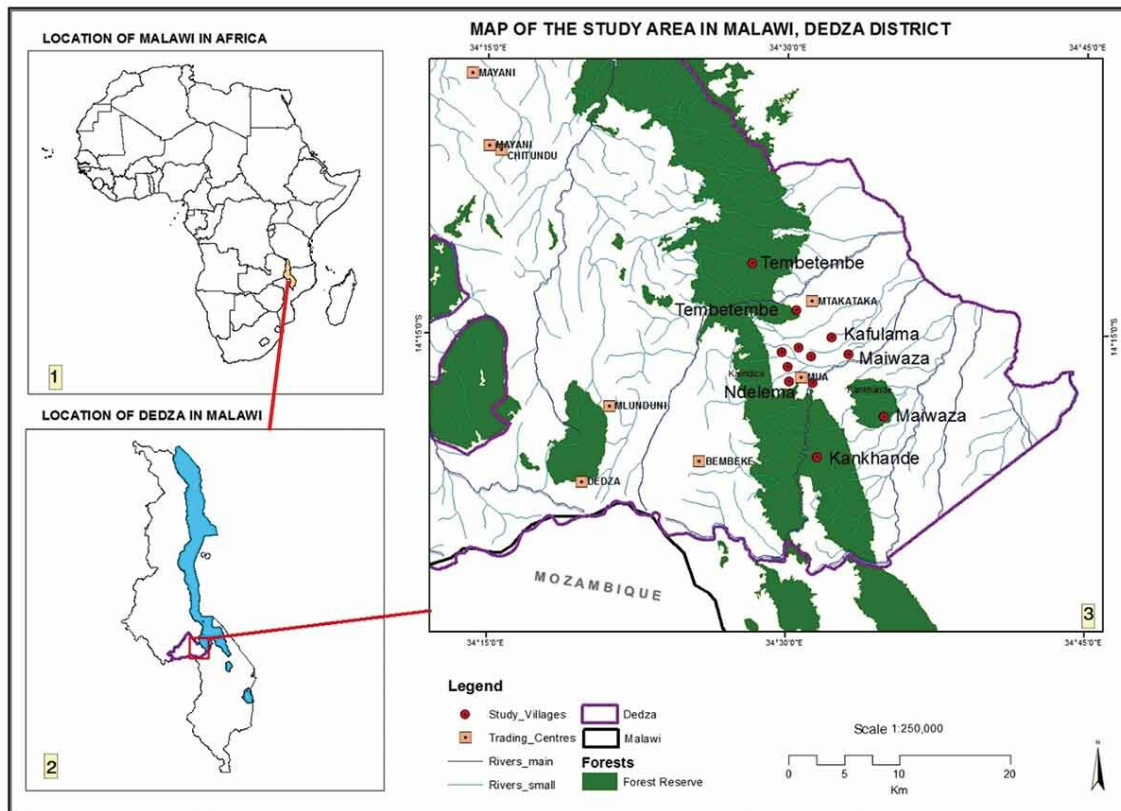


Figure 2. Map of the location of Mua-Livulezi Forest Reserve.

The majority of the households are subsistence farmers, with average landholding size of 0.8 ha. The most commonly grown crops are maize, groundnuts, beans, cassava and sweet potatoes. In addition, the people rear livestock, which include cattle, goats, sheep, pigs, and chickens. These agricultural products are mainly used for household consumption and excess are sold to purchase other household necessities (Department of Forestry, 2007).

Sampling framework and data collection

The research applied purposive sampling, to select the site (Mua-Livulezi FR) and target communities involved in participatory forestry activities promoted by IFMSLP. A sampling intensity of 30% was used to randomly select eleven out of 37 participating villages to ensure that the villages selected are a true representation of the population (Turyahabwe, 2006). The villages are in the area of Group Village Headman (GVH) Kafulama in Traditional Authority Kachindamoto, in Mtakataka, Dedza (GoM, 2013). Proportional random sampling was used to select households for interviews to allow for a representative sample from each village and reduce sampling error (Palinkas et al., 2013; Scheaffer et al., 2012). Each village was taken as a subpopulation and sample size in each village was allocated proportional to its population. Three hundred (300) households were selected. Annex 1 provides the sampling framework.

Data were collected between August and October 2013, using household interviews and focus group discussions. Three hundred (300) households were interviewed using a structured questionnaire. The questionnaire captured information related to demographics, household assets, livelihoods, forest use, sources of income and participation in PFM activities.

Focus group discussions were conducted with members of local forest organizations, Block Management Committees (BMC), Village Natural Resources Management Committee (VNRMC) and Forest User Groups (FUG), to get their perception of participatory forestry management, the institutional arrangements, participation in forestry activities, adherence to rules, performance of the committees and patterns of interaction with other actors involved in forest management in the area (see Annex 2). This information was generated to learn about the communal capital assets that people had access to. For social capital, the LFOs were asked to rate various aspects by scoring using pebbles at a scale of 1 to 5. The study also relied on secondary data, which included project documents, District Forestry Office reports, records kept by communities and other documents.

Data analysis

Data from the questionnaire were coded and processed using Statistical Package for Social scientists (SPSS ver22) and subjected to further analysis using Statistical Analysis Software (SAS Enterprise guide ver4.3). Data from FGD were processed using descriptive analysis. Descriptive statistics were also generated for data on household demographics, basic needs, household assets, main livelihood strategies, reasons for choice of the livelihood strategies, shocks and coping strategies, and food shortage and associated coping strategies. Food shortage was not combined with shocks because, in itself, food shortage is not a shock but rather a result of a shock. In addition, food represents household's current consumption (basic need), which can influence use of forests in a household's livelihood system, while shocks are related to safety net role of forests (Cavendish, 2003; Shimizu, 2006). ANOVA F-tests were used to test differences among the livelihood strategy groups. The livelihood strategy groups were created by statistical cluster analysis of the livelihood activities using SAS and three groups were created: farm based, wage based and diversified.

In order to identify key factors that statistically differentiated households pursuing different livelihood strategies, a multinomial logistic regression (MLR) analysis was conducted on selected asset-based explanatory variables. MLR was chosen over binomial logistic model because the independent variable (livelihood strategies) had more than two categories (Bayaga, 2010) and MLR is able to model unordered categorical response variables (Hutcheson, 2011). The multinomial logistic regression model was given as follows:

$$\ln \left(\frac{p_{ij}}{p_{i1}} \right) = \beta_{0j} + \beta_{1j}X_{i1} + \beta_{2j}X_{i2} + \beta_{3j}X_{i3}$$

Hence, let P_{ij} ($j = 1-3$) represent the probability associated with the livelihood strategy choice of a household i with $j = 1$ if the household's livelihood strategy is 'farm based'; $j = 2$ if the household's livelihood strategy is 'wage based'; and $j = 3$ if the household's livelihood strategy is 'diversified'. Farm based livelihood-strategy group was chosen as the reference group for the livelihood strategies because the majority of the households chose this strategy. The explanatory variables used were respondent characteristics such as age, gender, education (years of formal education), household size and land size. Age, education and households were run as continuous variables while gender and land size were run as categorical variables.

For coping strategies, regression analysis could not be conducted because the dependent variable had more than three categories. Therefore, the categories were cross tabulated against the demographics variables (age, gender, education level, household size), and land size. However, only two variables age and land size had a significant chi-square value and a further

analysis using Chi-Square Automatic Interaction Detector (CHAID) was conducted. CHAID is similar to regression and was chosen because it selects the best predictors that account for the most “explained” variance in variables and determines how variables combine to explain the outcome in a given dependent variable (Antipov & Pokryshevskaya, 2009).

RESULTS

Demographic characteristics of respondents

Out of the 300 respondents interviewed, 81% were women and only 19% were men. The average age of the respondents was 40. Out of those who had formal education, 73% had primary education, 12% secondary education and only 2% had tertiary education, while 13% had no formal education. The average household size was 5, with the majority of the households (58%) owning less than 1 hectare of land. The majority of the households (73%) owned livestock (cattle, goats and poultry or a combination of these). About 12% of the respondents had lived in the village for 15 years while the remaining 88% had been in the village for over 15 years, with the longest being 83 years. The majority of the respondents (97%) were located within 5 km of the nearest usable road all seasons.

Households forest use and participation in program activities

The study revealed that the majority of the households (92%) used forest products for own consumption while only 8% sold the forest products that they collected. The main product, which they collected was firewood as reported by 92% of the respondents. Their main source of forest products was the forest reserve (52%), seconded by own forest/land (23%). The majority of the respondents (71%) indicated that they did not participate in IFMSL program activities. Similarly, 72% indicated that they did not belong to any forestry related group.

Livelihoods and livelihood strategies

Access to basic needs

The basic needs that were examined included food, water, shelter, knowledge, skills, culture, institutions, income, health and religion. These basic needs were those that are consumed (subsistence) by family, whether group, individual or communal. A greater proportion of the interviewed households (91%) indicated that their needs were either partially met or met in most cases (Figure 3). However, for individual needs, a greater proportion of respondents felt that access to skills and institutions was not met.

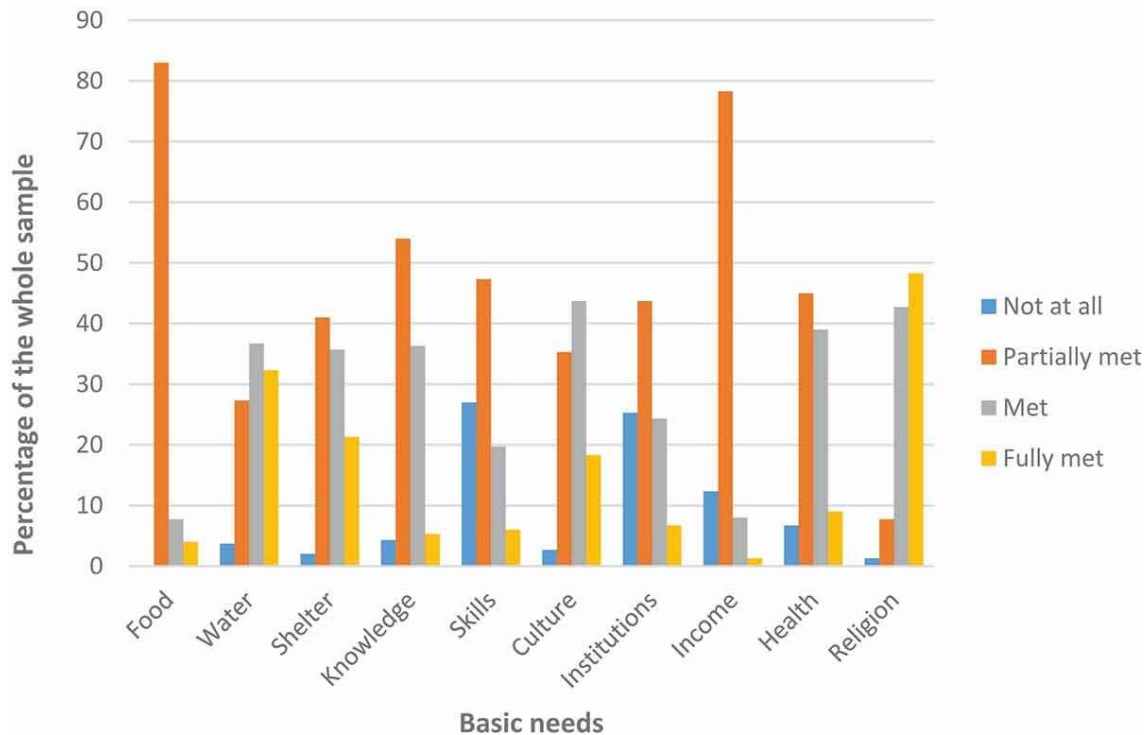


Figure 3. The extent to which basic needs are met.

Livelihood capital assets

In this study, the natural capital that household had access to include the forest reserve, the village forest area, other communal forests and the land on which trees could be grown, trees on farm, and around homesteads. Physical capital in this study was defined as encompassing forest management plans, access to the forest resource, availability of markets, and equipment for use in protection, harvesting and processing. Group discussions revealed that management plans for both the forest reserve and the village forest areas were developed. Introduction of co-management facilitated access to forest products through a local licensing system which was contained in the management plan. This meant that people could have free access to the forest reserve and forest products if for subsistence use, but had to pay a fee if for commercial purposes. The households had access to markets for major consumer goods, agricultural products and forest products within walking distances for all the villages, but these catered for subsistence needs. Though the villages had access to good roads to enable transportation of goods to viable markets, high transportation costs were a major limiting factor. As such, most of the forest-based enterprises that were initiated failed due to lack of markets. These included firewood selling, bamboo selling and bee keeping.

Human assets encompassed the knowledge and skills (and experience), cultural beliefs and health status, which are drawn upon in the management of the forest resource. Group discussions with non-committee members attributed to lack of knowledge and skills in forest management to selection of participants for training. Only those holding positions in leadership committees or a few selected individuals received training or other capacity-building initiatives. However, those involved in development of forest management plans had their knowledge in forest management enhanced through the learning-by-doing approach adopted for the facilitation of the PFM process. Indirectly, income from forest products was used by

some households to provide for educational needs of members of their household. The other human capital that the community relied upon was cultural beliefs (traditional leaders) and access to the forest for medicinal plants. Discussions with LFOs revealed that they received support from their traditional leaders in punishing offenders and mobilizing communities for program activities.

Financial assets encompassed commercialization of forest products as well as sources of finances for alternative income-generating activities. The most important source of income was agricultural crops (including resale of agricultural crops) as indicated by 30% of the respondents. Employment wages (from temporary/piece work such as working as laborers in other people's gardens and permanent work such as guards or patient attendant at the hospital) was the second most important source of income (25%) with remittances and pensions (14%) coming third. Forest products were in the fourth position, with only 10% of the respondents (Annex 2).

Access to savings and credit organizations was another important aspect of financial capital for livelihood improvement. However, our study revealed that only a few households had access to both formal (14%) and informal credit/savings clubs (27%). Group discussions with the block management committee (BMC) revealed that there were plans to increase access to credit clubs at local level through use of revenue from fees and permits for forest product by the BMC, as capital for this initiative. The BMC intended to use 10% of their share of the revenue to support village loans and savings (VSL) schemes. However, this had not taken off as the committee had not generated substantial revenue from the forest products.

Efforts were made to build social capital and this was in the areas of organizations (local forest organizations (LFOs)), norms, rules and sanctions as contained in the management plans, and networks. Only 28% of the households interviewed were members of LFOs. During focus group discussions LFOs scored participation of non-committee members in the activities (meetings, forest management activities) below average (score = 2), while participation of committee members was scored above average (score = 4). For the relationship with forestry staff, most of the LFOs indicated that they had a good relationship and trust (score = 4) with forestry staff and could be easily accessed if they needed technical support in the implementation of their activities. Table 1 provides the results of the focus group discussions.

Table 1. Scoring^c on aspects of Social capital

Aspect	Block Management committee	Village Natural Resources Committees						Forest User Groups		Mean Score
		Kafulama	Kalindiza	Kanyera	Kamchamba	Alufeyo	Tembetembe	Bee keeping	Curio makers	
Participation of members in LFO ¹	5	5	3	4	3	4	3	5	2	3.8
Performance of LFO ²	4	4	3	3	3	3	3	4	2	3.2
Participation of non-committee members in LFO activities ¹	3	3	2	2	3	3	2	2	1	2.2
Adherence to forest management rules ¹	4	3	2	2	4	3	2	2	1	2.6
Support from Traditional leaders ¹	4	4	3	3	3	3	3	3	2	3.1
Relationship with FD personnel ¹	5	5	4	3	4	3	3	5	3	3.9
Trust of LFO members to FD personnel ¹	5	5	4	3	4	3	3	4	1	3.6

Rating: 1 = very low, 2 = low, 3 = average, 4 = high, and 5 = very high

Rating: 0 = dead, 1 = very inactive, 2 = inactive, 3 = active, and 4 = very active

Scoring was done using pebbles.

Livelihood strategies

The main livelihood strategy for the majority (70%) was farm based followed by wage based (temporary/piece work and permanent, 18%) and diversified livelihood strategy (12%). The top three reasons for the choice of the livelihood strategy were main source for income and other household needs, inadequate capacity for other activities and that it provided adequate and immediate returns (Annex 4).

Table 2 presents the results of ANOVA of socio-economic characteristics when related to the three livelihood strategy groups. The results showed that only distance to the nearest road was statistically significant ($p < .05$).

Table 2. Characteristics of livelihood strategy groups

Household Characteristic	Livelihood strategy groups (mean values)			ANOVA F-test
	Farm based (n = 209)	Wage based (n = 54)	Diversified (n = 36)	
Age	40.40	39.39	37.50	NS
Household size	5.15	5.17	5.11	NS
Adult labour \geq 15 yrs. Old	1.99	2.16	1.70	NS
Education level (school years)	4.78	4.72	5.5	NS
Distance to nearest road	1.22	2.11	1.43	**
No. of cattle	3.26	3.75	3.83	NS
No. of goats	4.30	3.87	4.63	NS

**significant at 0.05

Table 3 shows the parameters for the multinomial logistic regression model. There were two sets of parameters representing the two binary comparisons that were made between the three livelihood strategy groups. The analysis showed that only landholding size was a significant predictor of the livelihood strategy, more specifically land categories of 1 ha and >1 ha. Comparing individual livelihood strategy groups, diversified and farm based appear to be similar as all explanatory variables are insignificant while wage based and farm based are differentiated on the basis of landholding size, specifically 1 ha and >1 ha. For a unit increase in land holding size, the log odds of a household with 1 ha and >1 ha to select wage based livelihood strategy, as opposed to farm based strategy, decreased by 1.34 and 1.87, respectively. This equated to an odds ratio of 0.262 ($e^{-1.34}$) and 0.154 ($e^{-1.87}$), respectively. Therefore, households with landholding size of 1 ha and >1 ha were more likely to opt for a farm based livelihood strategy than a wage based livelihood strategy.

Table 3. Regression analysis for livelihood strategy groups

Parameter	Livelihood strategy group*					
	Wage based			Diversified		
	<i>estimate</i>	<i>Standard error</i>	<i>Odds ratio</i>	<i>Estimate</i>	<i>Standard error</i>	<i>Odds ratio</i>
Age	-0.003	0.01	0.997	-0.01	0.01	0.989
Gender	-0.42	0.40	0.655	-0.47	0.45	0.623
Education	-0.02	0.05	0.985	0.05	0.06	1.047
Household size	0.006	0.08	1.006	-0.04	0.10	0.965
Landholding size						
<1ha						
1 ha	-0.73	0.48	0.482	0.99	1.07	2.696
>1ha	-1.34**	0.70	0.262	1.74	1.13	5.719
	-1.87***	0.65	0.154	0.95	1.12	2.587

Total N = 299; *reference livelihood strategy group is farm based

** $p \leq 0.1$; *** $p \leq 0.05$

Shocks and coping strategies

The study revealed that the prominent shocks that the households faced in the last 12 months were serious crop failure (attributed to a short rainy season), and serious illness (32%) (See Annex 5). Only 35% of the households interviewed indicated that they experienced positive income shock, the majority of which was used for food and hospital expenses. Nearly 83% of the households indicated that they had experienced hunger in the previous 6 months.

Table 4 indicates that households in this study responded to the shocks mainly by doing extra casual work (labor sales), asking for assistance and sale of agricultural products. For food shortage, they opted for reduced number of meals and food portion sizes.

Table 4. Households' coping strategies

Unexpected event/Shocks			Food Shortage		
Coping strategy	Frequency	Percent	Coping Strategy	Frequency	Percent
Did extra casual work (piece work)	124	42.8	Reducing number of meals	154	62.1
Obtained assistance	45	15.5	Reduced amount of food served	40	16.1
Sold agricultural crops	30	10.3	Asked my neighbour for food	25	10.1
Sold assets (e.g. livestock)	24	8.3	Did extra piece work	21	8.5
Spent cash savings	22	7.6	Other strategies (forest products, buying, etc.)	8	3.2
Other strategies (small business, reduced spending)	19	6.6			
Harvested more forest products	14	4.8			
Obtained a loan	12	4.1			

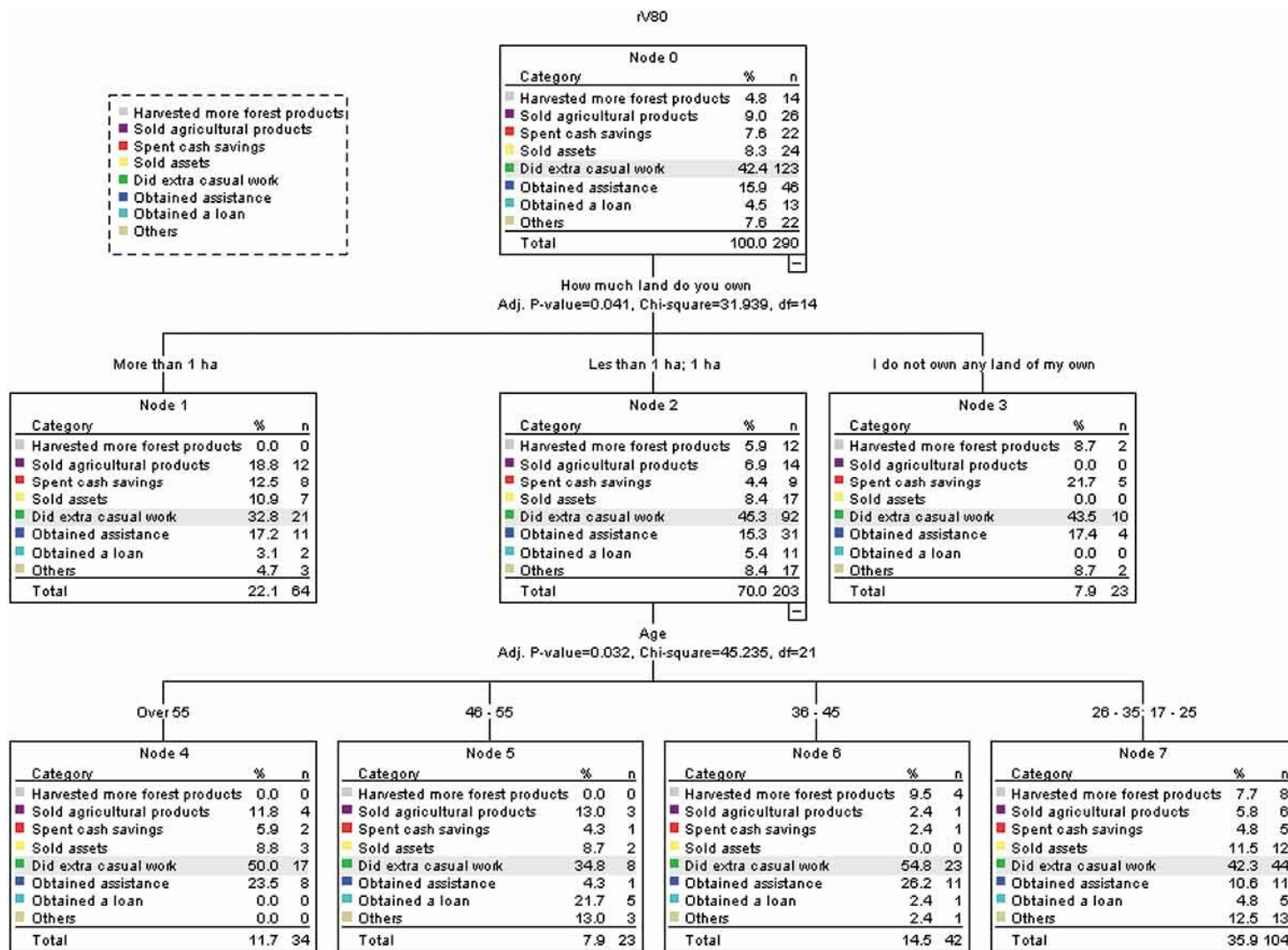


Figure 4. CHAID analysis for factors determining coping strategies.

Factors determining choice of coping strategies

The CHAID analysis (Figure 4) revealed that land size had the strongest association with the coping strategies followed by age. The highest proportion of households within the categories of the two variables coped with shocks related to unexpected events, by doing extra casual work; a coping strategy chosen by the majority of households. For land size, the proportions within categories were as follows: >1 ha (33%); <1 ha and 1 ha (45.3%) and no land (44%) while for age the proportions were as follows: >55 (50%); 46–55 (35%); 36–45 (55%) and, 26–35 and 17–25 (42%). For age, the categories 36–45 years and >55 years, showed the highest and second-highest proportion for those that opted for casual work (piecework).

DISCUSSION

Realization of basic needs

There are certain needs to which forests can contribute directly or indirectly, while supporting current consumption, providing a safety net and a possible route out of poverty (Cavendish, 2003; Tyynelä & Niskanen, 2000). These include food, income, health, institutions, knowledge and skills, which are essential to the wellbeing of rural communities. Access to these basic needs determines how one is classified: poor if the individual has inadequate access and well-off if the individual has adequate access (Wong, 2012). Predetermination of these needs by professionals at the onset of the program might have contributed to low participation in program activities. Chinangwa et al. (2016) suggested that community participation in a program increase when communities measure perceived benefits in terms of economic, social and non-cash benefits.

Lack of access to skills and institutions meant that local institutions could not provide the platform for learning and developing skills and attitude in areas beyond the forestry sector (Coutts et al., 2019; Hinchcliffe et al., 1996). Therefore, proper application of the SLA process at the beginning of IFMSLP, would have determined the roles that forest resources could have played in meeting basic needs. This may have resulted in visible changes in people's livelihoods and in forest conditions.

Livelihood capital assets

Participatory forest management can have positive impact on people's livelihoods through improvement in livelihood assets (Safa, 2004). The process of analyzing livelihood impacts is two pronged; it looks at the causal factors that change the local situation and the actual livelihood impacts as suggested by Dev et al. (2004). However, this study focused on the causal factors and our discussion of results was therefore, based on the existing situation in the communities adjacent to the Mua-Livulezi forest reserve with respect to the five types of livelihood capital assets.

Communities adjacent to forest areas can directly benefit from forests when they have access to the natural capital in forests (Larson et al., 2004; Newton et al., 2016). This is a necessary condition; this condition was met in the study area as the communities had usufruct rights to Mua-Livulezi Forest Reserve and Kafulama Village Forest Area (VFA) granted under the co-management agreement. Introduction of PFM (co-management) provided the platform for communities to negotiate access and management rights and therefore, ensure the flow of benefits from the forest. However, destructive behaviors such as illegal product extraction,

encroachment and charcoal burning led to degradation of the resource, thereby reducing benefits from the resource. As for physical capital, introduction of co-management meant that people had access to forest resources that previously they did not. Introduction of fees for commercial product use and fines for illegal use, however, resulted in other people traveling longer distances to collect forest products in areas that were not under co-management. This was either because they did not want to pay the fees or could not afford the fees. This is consistent with what Kajembe and Kessy (2000) reported in Tanzania that restricted access to forest products resulted in shifting of forest-product collection resulting in illegal collection in nearby forests. Better road access is associated with higher household income (Belcher et al., 2015). Despite the communities being in proximity to good roads to enable access to profitable markets for most goods, high transportation costs and limited processing capacity were key constraints to accessing these markets.

The key human asset that the communities relied upon was culture, more specifically the support received from their traditional leaders. As such, people had attuned their behavior to what their traditional leaders expected of them. This corroborates other research findings that the way people react and behave in relation to access and management to forest resources is influenced by their cultural values (Tabbush, 2010). Traditional leaders are relied upon to guard customary lands and local knowledge and customs, handle conflicts and assist in organizing the wider community to participate in PFM activities (Campbell & Shackleton, 2001; Zulu, 2012). The influence of traditional leaders was further confirmed when it was revealed that the Traditional Authority (TA) directed that a chief's committee be formed to enhance participation of village headmen in forestry activities, otherwise they would be dethroned (Senganimalunje et al., 2015).

Co-management created a new form of social capital (Senganimalunje et al., 2015), but these were not developed to such a level that the communities could act as a cohesive unit. A cohesive community is one that complies with rules and norms, is linked with other community organizations, and is able to access and influence institutions with higher power (Sanginga et al., 2007).

Although forests were not a significant source of income in this study, other studies in Malawi and elsewhere have shown that income from forests can assist households to deal with hardship and lift their income levels hereby improving their living standards (Chinangwa et al., 2016; Fisher et al., 2010; Jumbe & Angelsen, 2006; Shackleton et al., 2008; Zulu, 2013); This can happen when they engage in value addition and sale of high-value forest products. However, this contradicts what Nerfa et al. (2020) reported for Malawi, Hlaing et al. (2017) for Myanmar, and Persha and Meshack (2016) for Tanzania, where forests contributed lowly to household income. Similarly in our study, forest products were ranked low as a source of income for the households, given that the actual exchange value of miombo woodlands is generally low and inefficient to benefit large numbers of people individually (Zulu, 2008). Furthermore, Coutts et al. (2019) reported that studies on micro-enterprises in Malawi showed that little to no profit or savings were generated as monies earned are used to meet immediate needs. This therefore gives credence to the initiative taken by the BMC to establish village loan and savings schemes. This could contribute toward income redistribution and increase the number of people benefitting from forests (FAO, 2014; Jumbe & Angelsen, 2006).

Livelihood strategies

The dominant livelihood strategy in the area was farming and this was at subsistence level. This could be an indication that farming was not able to meet even the consumptive demands of the households and therefore, could not be relied upon to contribute to poverty reduction. This is in agreement with results reported by Orr and Mwale (2001), Ellis et al. (2003), and Hatlebakk (2012) in Malawi. Similarly, Babulo et al. (2008) and Barret et al. (2001) reported of the unreliability of farming as a strategy for poverty reduction in studies on livelihood strategies in Ethiopia, Cote d'Ivoire, Kenya and Rwanda, respectively. Hence, they recommended, development of non-farm activities that can diversify rural opportunities and incomes for poverty reduction. This, therefore, provides opportunity for forest development as a strategy for livelihood improvement.

The livelihood strategies that rural households pursue depend on livelihood assets they have and the ability to substitute between the assets and activities. In addition, the external environment determines the remoteness of an area, which in turn determines the livelihood strategies and the options that can widen choices (Ali et al., 2007; Alwang et al., 2005; Ellis, 1999; Smith et al., 2001). Our study showed that most of the households possessed few assets that could easily be substituted to diversify livelihood activities. These assets did not bring any differentiation between the three livelihood strategy groups. However, when communal assets were considered, the livelihood strategy groups were differentiated by distance to nearest road. A good road provides the potential to improve livelihoods by providing transport services to markets and improving access to information (Hettige, 2006; IFAD, 2003). The market within the study area was small and the two town centers that could provide more market opportunities were located 2 h away. Dynamic livelihood systems pay off in the form of increased income and acquisition of new skills for the livelihood system to continuously evolve (Smith et al., 2001; Alwang et al., 2005). Differential access to markets for production inputs, household products and requirements, enabled some households to have more dynamic livelihoods than others. Regression analysis, however, showed that the livelihood strategy groups were differentiated based on landholding size. This result might be related to the characteristics of the environment and the households themselves. The area is remote with the majority of individuals looking at farming as their main livelihood option. This result agrees with Hatlebakk (2012) who reported that land was one of the important determinants of livelihood strategies in southern Malawi.

The central role that farming played in the livelihood systems of the communities in our study is consistent with the fact that Malawi is a predominantly agricultural based economy, with the majority of rural people practising subsistence farming (Ellis et al., 2003; Hatlebakk, 2012). The reasons for the choice of the livelihood strategy confirm what Belcher et al. (2005) indicated that in a subsistence economy, people's primary focus is food production and maintenance of shelter and security, and will move to higher rewarding activities when food and other necessities are met.

Shocks and coping strategies

Our findings of the main shocks experienced by the households agree with Romero and Nagarajan (2011) who indicated that rural households in Malawi experience shocks such as frequent droughts, floods, and other unexpected adverse events such as illness and price fluctuations. Similar results have been reported for Ethiopia (Dercon et al., 2005) and South Africa (Mbiba et al., 2019; Ofoegbu et al., 2016; Shackleton & Shackleton, 2004). Coping

strategies are one of the determinants of livelihood diversification and comprise measures that include using savings, sale of livestock and other assets, assistance from family and friends, increased reliance on forest products, and sale of agricultural crops among others (Ellis, 2000; Ofoegbu et al., 2017). The coping strategies adopted by households in this study are in agreement with results reported by Romero and Nagarajan (2011), Orr and Mwale (2001) for Malawi and Oldewage-Theron et al. (2006) for South Africa. Furthermore, the results agree with Whiteside (2000) who reported that piecework ‘ganyu’ is the most important coping strategy that supports people during crucial hunger period until the next harvest for most poor households in Malawi.

Forests did not play a significant role in assisting households to cope with shocks. This is in agreement with what Wunder et al. (2014) and Chilongo (2014) reported that forests were ranked lower than most alternatives, suggesting that forest resources may be less important as a safety net and a buffer between agricultural harvests than has been reported in many case studies. Such studies include results reported by Djoudi et al. (2015) globally; Shackleton and Shackleton (2004) in South Africa, and McSweeney (2005) in Honduras where sale of forest products generated substantial income to allow the households to cope. The insignificant role of forest resources could be attributed to gaps in the development of social capital. Belonging to a group allows members to live according to certain norms, obligations, reciprocity and trust (Smith et al., 2001), which increases cooperatives, collective action and general capabilities related to forest governance. Furthermore, individuals could use their membership to achieve individual goals, economic or otherwise, some of which might be related to dealing with shocks. Hoque (2008) provided evidence of socio-economic well-being attributed to membership in a forest user group.

Households differ in the way that they respond to shocks and this can be attributed to the nature of the event, as well as household attributes. Piecework in a rural setting is a physically demanding activity, often involving working as laborers in fields of wealthier households (Kalinda, 2014; Whiteside, 2000). It is therefore understandable for those in age group 36–45, for they are within the economic productive age group. This also explains why the age groups 17–25 and 26–35, came third. However, it is surprising that those over 55 years came second, since their physical strength would be waning at this age. One explanation could be the gender composition of the sample; the larger proportion of the respondents was women who might have limited alternatives to choose from and therefore, opted for what is familiar. The results also showed that there was an interaction between age and landholding size as shown by the line connecting the two variables (Figure 4). This indicates that age can be used to predict choice of coping strategies, in combination with the landholding size categories equal to or less than 1 ha. The negative correlation between household size and age, and food shortage (hunger) coping strategies, indicated that as the household size and age increased, the ability of the household to cope reduced. This result concurs with that of McSweeney (2003) and, Fisher and Shively (2005) who reported that households that were headed by younger male, had more household members but less land were more likely to engage in forest products’ sale to cope with shock.

STUDY LIMITATIONS

While this study has contributed to the body of literature about co-management it is limited in a number of ways. First, it was challenging to access information on previous studies and research reports on co-management of forest reserves with the current institutional set up in Malawi since previous co-management programs were on pilot basis. This limited my access

to extensive arguments about the performance of co-management in Malawi. Secondly, this research had time constraints that could not allow measurement of changes in livelihoods over time. The study could not deeply examine issues of benefit sharing and forest-based enterprises which are critical for sustainable livelihoods and future of co-management in Malawi.

CONCLUSION

The study was aimed at identifying and explaining the livelihood strategies of households and the role of forest resources and income in achieving livelihood outcomes in the study area. Specifically, the study examined household basic needs and assets, forest use, the main livelihood strategies, shocks and coping strategies. The study has shown that there are gaps in meeting the basic needs for most of the households. However, the main unit of investment in co-management is social capital, which enables the communities to govern their natural resources collectively and therefore, build trust, cooperation, assertiveness and general capabilities. We assume further development of this social capital could have positive effects on the development of the other capitals. This would provide the social capital currency that allows for a successful co-management arrangement because it will increase cooperation and reduce transaction costs of working together toward sustainable forest management.

This study also revealed that forests are playing a minimal role in the livelihoods of household adjacent to the forest reserve. The forest use was mainly supporting subsistence needs (current consumption) with negligible contribution toward provision of safety net and a pathway out of poverty. Development of forest-based enterprises was not successful thereby denying the communities an opportunity to add value to the forest products and generate substantial amount of revenue. The unexpected events (shocks) that communities face, the livelihood capital/assets that they have, the livelihood strategies they adopt determine what role forests can play in their livelihoods. These have to be considered when implementing participatory forest management activities; and mechanisms should be put in place to ensure that users are continuously involved and supported in turning access to forests and forest products into goods and services for livelihood improvement and sustainable forestry.

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