PEOPLE AND FORESTS INTERFACE:

CONTRIBUTION OF LIBERIA'S FORESTS TO HOUSEHOLD INCOMES, SUBSISTENCE, AND RESILIENCE

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People and Forests Interface - Contribution of Liberia's Forests to Household Incomes, Subsistence, and Resilience

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Acknowledgements

All data collected during this survey is available in anonymized format in the World Bank Data Library: https://microdata.worldbank.org/

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Abbreviations

CAPI	Computer Assisted Personal Interviewing
CIFOR	Centre for International Forestry Research
CRL	Community Rights Law
EA	Enumeration Area
FAO	Food and Agriculture Organization of the United Nations
FDA	Forestry Development Authority
HIES	Household Income and Expenditure Survey
HH	Household
LSMS	Living Standards Measurement Study
LSMS-ISA	Living Standards Measurement Study – Integrated Surveys on Agriculture
LISGIS	Liberia Institute of Statistics and Geo-Information Services
NFRL	National Forestry Reform Law
NGO	Nongovernmental organization
NHFS	National Household Forest Survey
NTFP	Non-timber Forest Product
PA	Protected Area
PES	Payment for ecosystem services
PROFOR	World Bank Program on Forests
RuLIS	Rural Livelihoods Information System
SFM	Sustainable Forest Management

Key Findings

CONTRIBUTION OF FORESTS TO SUBSISTENCE

Over **40 forest products** collected

Top 5 products **collected for subsistence**: fuelwood, poles, bushmeat, rattan, and fronds

Over 3 hrs (per day) spent by HHs to collect forest products for subsistence

95%
HHs depend on **fuelwood for energy**

36%
HHs use forest products for **dwelling construction/ maintenance**

>50%
HHs depend on **medicinal plants** for medical needs

CONTRIBUTION OF FORESTS TO RESILIENCE

43%
• HHs use forest products to **recover from shocks**

66%
• HHs rely on forest products to **overcome food security shocks**

• Bushmeat, bush yam, and fish **most frequently used**

CONTRIBUTION OF FORESTS TO INCOME

35%
• Contribution of income from **forest products to total HH income**

• Timber, bushmeat, and gold - **most important products collected** in forest for income generation

GENDER

• Female participation in community meetings on forest usage is high; yet **86% of men and 78% of women** favored further increasing female participation

• **78% of men and 79% of women** think women should have a **greater role** in forest-related businesses

THE KEY FEATURES OF THOSE SURVEYED IN THE NHFS

27 years	24%	4	2.72 years
Average age	Female headed HHs	Average numbers of individuals in a HH	Mean education of all adults (>=18 yrs)

EXECUTIVE SUMMARY
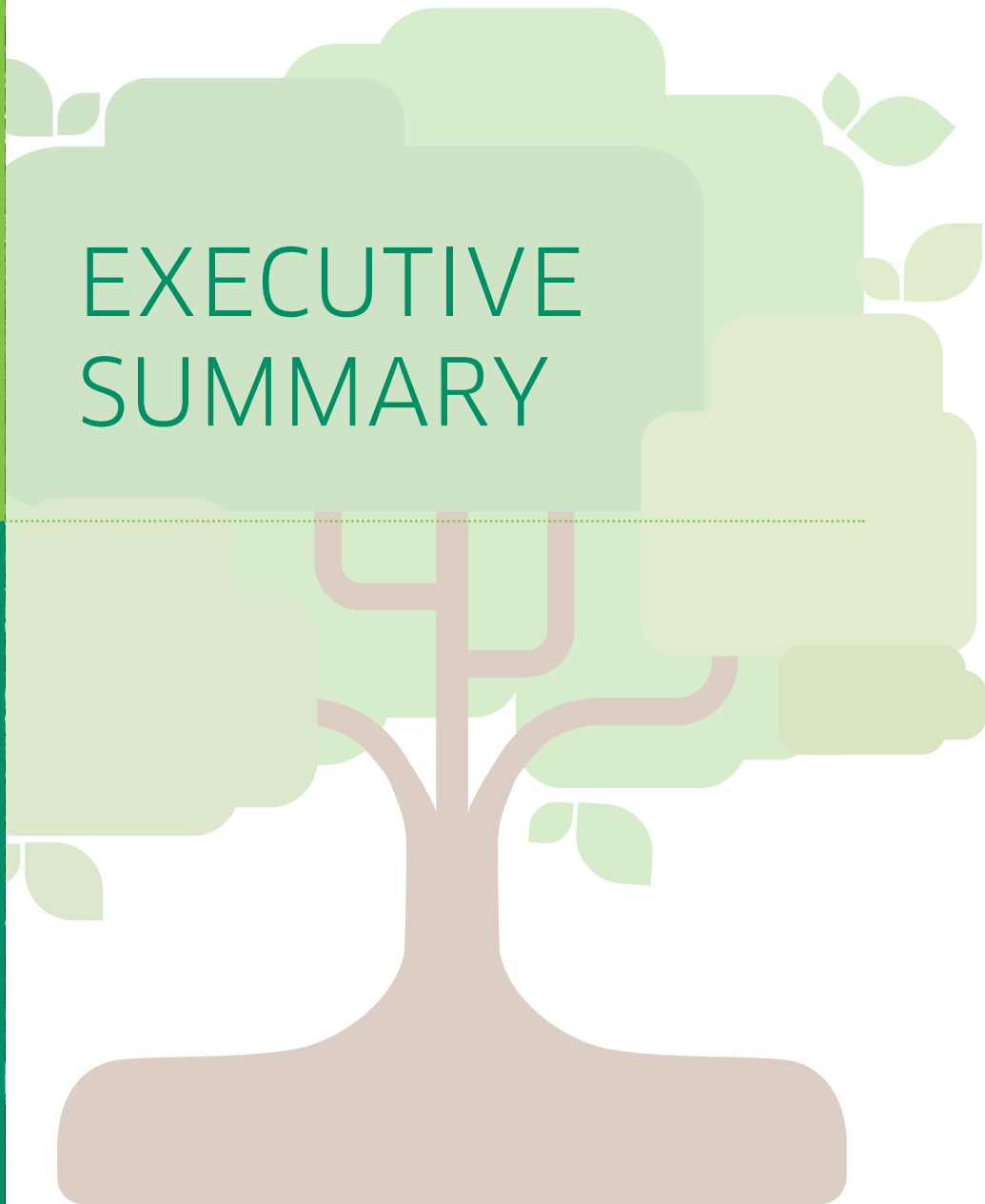
ES.1 MOTIVATION FOR THE LIBERIA NATIONAL HOUSEHOLD FOREST SURVEY (NHFS)

Liberia is one of the most forested countries in West Africa, with more than two thirds of its land surface covered by forest. The National Forest Inventory, conducted by the Liberia Forestry Development Authority in 2018 and 2019, estimates the forest cover in Liberia to be 6.69 million hectares which is approximately 69 percent of the total landmass.[1]

Liberia's formal (measured) forest contribution to the national economy runs between nine and 10 percent of gross domestic product (GDP). Forestry is the fourth largest contributor to economy, after services, agriculture and fisheries, and mining and panning. According to the 2020 Forest Resources Assessment produced by the Food and Agriculture Organization of the United Nations (FAO), as of 2015, around 39,880 full time equivalent workers (of which about 35 percent women) were formally employed by the sector.[2] However, the formal sector is just a small part of the story.

Informal, and largely unmeasured, forest activities provide an important source of jobs and incomes for rural Liberians. This informal sector provides incomes and employment through activities such as chainsaw milling and charcoal production. The informal chainsaw milling sector provides between 19,000 and 24,000 permanent jobs to both urban and rural individuals. The annual revenue generated by chainsaw milling alone is estimated to be US\$31–41 million, or about three to four percent of Liberia's gross domestic product. Charcoal demand in Liberia was estimated at US\$46 million in 2018. The charcoal industry is thought to employ up to 28,000 people on a 'full-time equivalent' basis.[3]

The informal collection and use of non-timber forest products (NTFPs) are also important for forest communities. They provide a source of livelihood and food for much of Liberia's rural population, including fruits, plants, nuts, meat, and honey. NTFPs, such as rattan, are used for making furniture, and they are also a source of traditional medicines. Several NTFPs have been identified as having market potential which could be further developed.[4]

Clearly, forest-related products and environmental services make significant contributions to the subsistence, incomes, employment and coping needs of poor rural households (HHs). Yet, in national income accounting, these contributions are often ignored, or are only partially measured. This is as true for Liberia as for many other countries worldwide. Without detailed data on HH and forest interactions, policy makers are unable to understand the economic and social interactions between HHs and forests and the effects these have on both people and forests.

This data-gap was emphasized in the Liberia Country Forest Note prepared in 2018 and the Liberia National Household Forest Survey (NHFS) was implemented to close this data gap. Significant dependence of forest-proximate HHs on forests for subsistence needs and incomes was the main prior assumption for the survey.[5]

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1   NFI 2020.
2   FAO 2020.
3   Hooda et al. 2019.
4   USAID 2015.
5   Hooda et al. 2018

The data gathered by the Liberia NHFS were detailed, exploring the relationship between people and forest products, environmental services and behaviors, and also the contributions forests make to livelihoods and managing disasters and shocks. In the context of its main prior assumption (of significant HH dependence on forests), the survey collected information on the following key questions:

- What proportion of total HH income comes from forests?
- What types of forest products are collected and when?
- What is the extent of local processing of forest products?
- How much of the forest products collected or processed is for self-consumption, and how much for sale and trade?
- Do forests perform a safety net function during and after periods of shocks, caused by events such as pandemics, droughts, fires, and floods?
- What are the local rules governing the use of forests?
- What is the role of women in decision-making related to forest use at the community level?
- Who runs forest-based enterprises?
- How important and prevalent are the environmental services from forests?

A First of its Kind in Liberia

- The survey was administered country-wide to forest-proximate HHs, to get the most accurate information on the dependency of HHs on forests.
- The data provide an estimate of total HH income *(NOT usual for these types of surveys)*.
- This survey is important for understanding the contribution of forests to total HH income.
- The survey included questions that explored gender issues *(NOT usual for these types of surveys)*.
- This survey used the Computer-Assisted Personal Interview (CAPI) approach for the first time in a forest sector survey in Liberia. CAPI involves the electronic capture of data on tablets during interviews and focus groups.

ES.2 LIBERIA NHFS APPROACH AND SURVEY INSTRUMENTS

Enumeration Areas (EAs)

Enumeration Areas (EAs) are the smallest standard administrative division used for census and other statistical operations. EAs in Liberia have an average of 96 HHs each.

The survey focused on forest proximate HHs to get the most information on the full extent of the dependency of HHs on forests. Ninety-four percent of HHs were located in Enumeration Areas (EAs) with center points within 2.5 kilometers from the nearest forests. Data were collected across all 15 counties of Liberia (with the exception of the Greater Monrovia area). The survey covered 3,000 HHs in 250 EAs through a detailed HH questionnaire. In addition to HH level survey, data were also collected at community level from 250 community focus groups, using a community questionnaire. This was designed to complement the HH survey on aspects such as gender, community level decision making, community enterprises, and participation in forest-related programs (see Fig. 1). Full details on the selection of HHs and the content of the questionnaires can be found in the Basic Information Document.[6]

The forest-proximate group (from which the survey sample was drawn) comprises about 47.5 percent of the total Liberian HHs.[7] In 2018, it estimated that this group had an average annual HH income of US$783 (equivalent to 54 cents per person per day) which was substantially below the average annual HH income of US$2,440.[8] By implication, the survey findings are highly relevant for targeting the forest-proximate group in achieving development objectives set in Liberia's pro-poor agenda for prosperity and development (PAPD).[9]

Forest-proximate

In the context of this survey, we use the term forest-proximate to describe communities (and HHs in them) living in EAs situated within 2.5 kilometers of a forest.

Economic, social and environmental conditions, such as density of forest cover, poverty rates, and urbanization vary across Liberia. The survey needed to explore the influence of these factors on HH dependence on forests. In order to examine the possible variations in forest dependency across the country, the HH and community survey data were analyzed using three regional clusters. These comprised the Western Cluster (including Bomi, Gbarpolu, Grand Cape Mount, and Lofa counties), the Central Cluster (including Bong, Grand Bassa, Margibi, Nimba, and rural Montserrado counties), and the Eastern Cluster (Grand Gedeh, Grand Kru, Maryland, River Cess, River Gee, and Sinoe counties). These clusters had variations in several socioeconomic factors (such as poverty rates, forest cover, road density, and concessions) and the preliminary analysis attempted to correlate the survey findings with these variations.

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6   Available in the World Bank Data Library: https://microdata.worldbank.org/.
7   LISGIS 2016.
8   World Bank Group 2018.
9   Republic of Liberia 2018.

Figure 1 | Liberia NHFS Forest Cover in the Three Clusters[10]
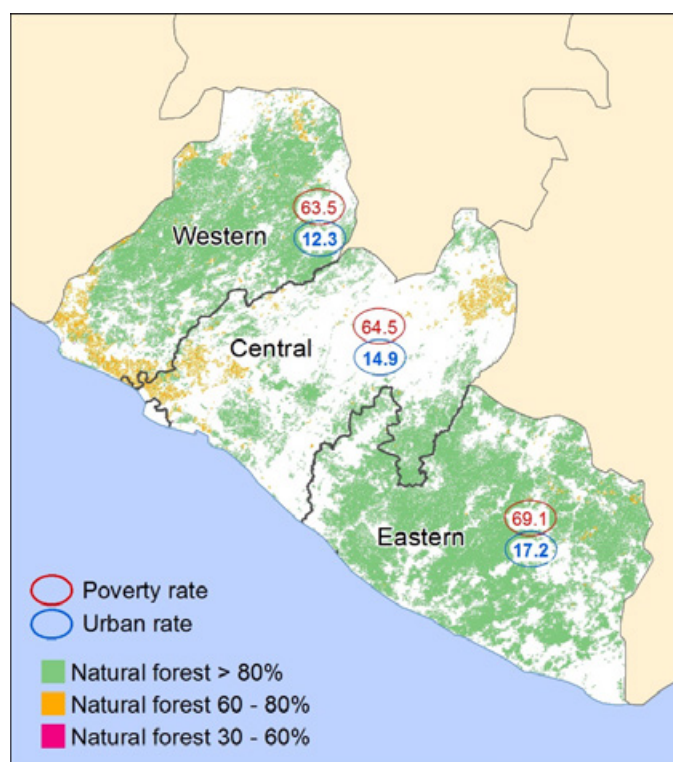
The survey instruments (HH and community questionnaires) were based on the publicly available National Socioeconomic Surveys in Forestry guidebook and a set of specialized forestry modules.[11] The guidebook modules were adapted to the Liberian context and the Liberia NHFS used these modules to collect information on the full range of forests' contribution to HH livelihood and incomes.[12] Borrowing from the Liberia Household Income and Expenditure Survey instruments[13], they were then supplemented with several modules on income to allow for computation of total HH income.

The fieldwork for the survey was conducted between August 2018 and January 2019. It was led by the Forestry Development Authority (FDA) and the Liberia Institute of Statistics and Geo-Information Services (LISGIS), with support from the World Bank.

In addition, there is a significant data gap on the issue of gender and forests. To address this gap, the survey team developed a questionnaire module on gender-related aspects of forest enterprises and female participation in local-level decision making on forest use.

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10 The white areas in Figure 1 are excluded from the NHFS sample, as they lie outside the 2.5 kilometer buffer.

11 These were developed jointly by the Living Standards Measurement Study (LSMS) team of the World Bank, the World Bank's Program on Forests (PROFOR), the Food and Agriculture Organization of the United Nations (FAO), the Center for International Forestry Research (CIFOR), and the International Forestry Resources and Institutions Network. See: http://www.fao.org/forestry/forestry-modules/en/

12 Similar surveys have been undertaken in three other countries, Armenia, Georgia and Turkey, with a focus on fuelwood dependence, forest-poverty-livelihood linkages, and, forests-poverty-migration, respectively. The findings and recommendations from these studies were used to inform national forest policy reform in these countries.

13 LISGIS 2016.

ES.3 KEY FINDINGS

There were seven main themes identified from the survey data. These are discussed below.

ES.3.1 FINDINGS FROM THE HOUSEHOLD (HH) DATA

Finding 1: There was a high dependence on forest products both for direct consumption and as a source of income.

- Income from forest products contributes on average 35 percent of the total HH income, ranging from 27 percent in the Western Cluster, to 32 percent in the Eastern Cluster and 40 percent in the Central Cluster.
- Fuelwood, poles, rattan, bushmeat and fronds were identified as the most important products collected (in order of importance) for cash and income generation purposes.

Finding 2: Forests offered important social safety-net functions when HHs experienced natural and economic shocks and crises such as droughts, fires, floods and pandemics.

- Forty-three percent of HHs reported using forest products to recover from economic and natural shocks. More than half of the surveyed HHs experienced some sort of economic or natural shock in the last 12 months. This translates to more than 285,000 forest-proximate HHs. Food price rise was identified as the most prevalent shock.
- Two thirds of HHs that experienced food insecurity relied on forest products to meet their needs during these times. Forty-six percent of HHs were food insecure at some point in the last 12 months, with the average period of food insecurity lasting approximately three months. The top three products used to cope with food insecurity were bushmeat, bush yam, and fish.
- The HHs in the Eastern and Western Clusters, with higher poverty rates (69.1 and 63.5 percent respectively, based on the 2016 Liberia Household Income and Expenditure Survey) and denser forests, relied more on forest products during economic and natural crises. High density forest areas tend to be more biodiverse and offer a wider variety of forest products which are easily accessible to HHs.

Finding 3: Forest products were important for HH livelihoods, and much of the collection of forest products was for subsistence needs.

(a) Collecting and processing for subsistence consumption
- Over 40 different forest products were reportedly collected by HHs. Of these, the top five products collected and identified as filling significant subsistence needs for food, energy and shelter were, fuelwood, poles, bushmeat, rattan, and fronds.
- In the last 12 months, the majority of HHs (70 percent) collected forest products for either self-consumption only, or for both sale and self-consumption purposes. Harvesting and collection of forest products is a year-round activity with no marked seasonality.
- HH members invested a significant amount of time and labor in collecting these forest products during the year. Every day, on average HHs spent one hour and ten minutes collecting fuelwood, over an hour collecting bushmeat, and another hour collecting fronds, poles, and rattan. Because the opportunity cost of their labor is low, HHs could afford to spend significant time on collecting forest products.
- Although the majority of HHs collected forest products, only 24 percent of HHs reported processing forest products.

(b) Dependence for HH energy needs

- Cooking needs drive HH energy needs and HHs are heavily reliant on fuelwood and charcoal for their energy needs. Ninety-five percent of the HHs rely on fuelwood while 21 percent use charcoal to meet their energy needs.
- Nearly all HHs (98 percent) collect the fuelwood they use. However, charcoal is usually purchased (54 percent of HHs).

(c) Dependence for construction materials

- Thirty six percent of HHs reported using forest products for dwelling construction or maintenance in the last 12 months. A majority of these (85 percent) relied heavily on forest products for construction or maintenance material. The top three forest products used for construction are poles, fronds, and timber.
- A vast majority of HHs sourced forest products for construction purposes from communal lands and reported that it was "very easy" to access them.

(d) Dependence for medicinal needs

- Of the HHs that sought some sort of medical assistance during the previous 12 months, over 50 percent used medicinal plants. Reportedly, 77 percent of these HHs collected medicinal plants from communal lands.
- In the face of declining availability of medicinal plants, as reported by 22 percent of HHs using medicinal plants, most HHs responded by allocating more time to collecting medicinal plants (24 percent) or cultivating them (39 percent).
- Despite an overwhelming preference for modern medicines (75 percent of HHs), only 22 percent of HHs actually purchased drugs or medicines. This is indicative of a lack of purchasing power and / or access resulting in a continuing reliance on medicinal plants.

Finding 4: HHs cleared forest lands to grow crops and plant trees.

- Twenty six percent of HHs reported clearing an average of 0.9 acres of forest land in the last 12 months. Forty four percent of these HHs cleared old-growth natural (primary) forest, and 53 percent cleared secondary or regenerating natural forest.
- HHs reported clearing forest lands to fulfil food needs. The main reason reported for clearing forest land was to plant crops (92 percent of HHs). The top two crops planted on the cleared forest land were rice (79 percent) and cassava (10 percent), followed by cocoa (two percent).
- Nineteen percent of HHs reported planting trees (over the past five years) to meet their food, timber, and medicinal needs.

ES.3.2 FINDINGS FROM THE COMMUNITY DATA

Finding 5: More men than women participated in community level meetings, ran forest-based businesses and benefited from development programs. However, the opinions of women in meetings were considered important by both men and women, and both men and women felt that women should have a greater role.

- Community level meetings to discuss forest usage occurred fairly regularly in about one-third of communities surveyed. HHs were represented most frequently by men. However, female participation in these meetings was high and women's opinions were given importance and incorporated into decision-making.

- There was a consensus across all the clusters, especially among men, that female participation should be encouraged more and that women should have on a greater role in managing forest-based businesses.
- Inclusion of issues that were of more interest to women, and, encouraging women to organize and lead some of the meetings, were suggested as ways to promote the participation of women.
- Forest-based businesses operated in about one-third of the communities. Most of them (about 70 percent) were managed by men.
- Participation in forest-based programs was perceived to be gender-biased towards men. Thirty percent of the communities reported that "mostly men benefited", and 17 percent reported that "only men benefited".

Finding 6: Both formal and informal local-level rules influenced how forest products were collected, and while community awareness about these rules varied, there was a consensus that rules were set by community heads. (The influence exerted by locally set rules was unexpectedly strong).

- The top three cash-generating products collected by communities were, bushmeat, timber, and gold.
- Only about half the communities were aware of both formal and informal rules related to the collection of these products.
- In case of fuelwood collection (primarily for self-consumption), only about 16 percent of communities were aware of the formal and informal rules.
- The biggest impact of these rules was on the quantity of the product collected. This was followed by the schedule of collection, and finally, on who was eligible to collect.

Finding 7: Participation rates in sustainable forest management programs was low, as was the receipt of external support such as training, policy information and free growth inputs. This was one of the lesser expected findings of the survey, in view of the attention this sector has attracted from international development partners and NGOs.

- Only 25 percent of communities surveyed had participated in any forest-related programs over the last five years. Rates of participation in forest-related programs during the last 12 months were even lower (eight percent).
- Communities participating in forest-related programs reported significant positive impacts on increased sustainable use (73 percent), increased biodiversity (70 percent), increased income (57 percent) and increased employment (42 percent).
- Only 16 percent of communities reported receiving any external support from forest-related programs over the last five years. During the last 12 months, the number of communities receiving any such support was even lower.
- Technical assistance, management training and policy information were the types of external support received the most although only by small numbers of communities (eight, seven and nine percent respectively). Free resources such as seedlings and implements, were received by very few communities (6 and 3 percent respectively).
- Government support benefited communities in all three clusters, with the largest engagement in the Western Cluster. The Eastern Cluster communities received the most support from the various nongovernmental organization (NGO) supported programs.

ES.4 RECOMMENDATIONS AND NEXT STEPS

The findings of the Liberia NHFS confirm the significant dependence of HHs on forest products, mainly for subsistence needs. There are few differences across the clusters, which suggest a lack of regional variations. Forest products contribute an average of 35 percent to the total income of forest-proximate HHs.

This dependency on forests and subsistence living is not surprising in the context of the overall socioeconomic situation in Liberia. Both semi-urban and rural populations have higher poverty rates. In addition, there are limited opportunities to generate sustainable sources of income to allow these HHs to exercise other alternatives for meeting basic needs for food, energy, medicine, and shelter.

The intensity with which HHs collect forest products depends on many factors. These include poverty rates, forest density, and accessibility to forests. It is also affected by the availability of other opportunities to access sources of food, construction materials, medicines, and whether they have access to markets. Given the overall high levels of poverty (50.9 percent nationwide as of 2016)[14] combined with ease of access to forests and a lack of economic alternatives, HHs are likely to collect larger amounts of forest products to meet their basic needs. This creates a vicious cycle of over-extraction, forest degradation, and ultimately a decline in the availability of resources to meet HH needs. In addition, without action, forests in Liberia will continue to be poverty traps for forest-proximate HHs. Forests will face more degradation and deforestation, and the situation for HHs and communities that rely on these forests for survival will deteriorate further.

The COVID-19 pandemic, currently raging worldwide, has added further urgency to understand the HH dependence on forests and on their sustainable management. The COVID-19 pandemic is exerting a significant negative impact on economic activity and employment, particularly nonfarm self-employment in urban areas. It is reducing demand for services, which disproportionately affects informal workers, and lockdown measures are restricting various forms of economic activity. Production of major commodities has slowed, while consumption has weakened.

Poverty rates are projected to increase as per capita income contracts and food prices rise. According to World Bank estimates, the share of the population living below the national poverty line is projected to increase from 55.5 percent in 2019 to 65.2 percent in 2020 under the baseline scenario and reach 68.9 percent under the downside scenario.[15] This will put added pressure on forests. Therefore, checks and balances would have to be put in place to ensure sustainability and keep deforestation and forest degradation under control.

For HHs, the pandemic has already created a precarious livelihood situation. The findings of a recent COVID-19 specific survey undertaken by LISGIS revealed that 67.5 percent of HHs reported loss of income since the outbreak. Food situation was made even more dire by an increase in the prices of major food items as reported by 66.4 percent of the HHs. Nearly 84 percent of HHs worried about not having enough food to eat as a result of lack of money or other resources.[16]

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14   https://data.worldbank.org/country/liberia?view=chart. Accessed on July 8, 2020.

15   World Bank Group 2020

16   https://frontpageafricaonline.com/news/liberia-statistics-houses-survey-shows-covid-19-negative-impact-on-households-businesses/.
       Accessed on August 14, 2020.

Forests have been shown to provide important safety-nets in terms of various crises such as floods, droughts, fires, food shortages, and pandemics. COVID-19 will exacerbate this. With the country going through a severe economic downturn, HHs are more likely to fall back on forests to meet their basic minimum needs.

It is crucial that, in Liberia, the unsustainable cycle of HH poverty and the use of forest products is broken. There is a need to place the spotlight on a suite of interventions to improve the basic well-being of these HHs and reduce their reliance on forests. This should be complemented with interventions aimed to improve the policy and regulatory frameworks for forest management.

The Liberia Country Forest Note, prepared in 2018, identified several sectoral challenges and opportunities to manage the issue of forest-proximate communities and the sustainable management of forests. These included:
- The potential to generate significant local incomes and employment through the processing and marketing of nontimber forest products (NTFPs), timber and charcoal
- The need for training and capacity building of communities
- The need to promote gender equality
- The importance of improving governance, particularly at community level, through appropriate governance structures
- The importance of encouraging collaborative sustainable management programs.

Through the lens of improving the welfare of poor rural HHs, this survey speaks to many of the above challenges and helps to identify feasible interventions. The seven recommendations, below, are based on the main findings from the survey:

Recommendation 1: Secure alternatives for meeting subsistence needs, for food, fuel, shelter, medicines

- In the short- to medium-term, options to provide HHs with fuel saving and clean cookstoves should be considered.
- There is a high reliance on forests to extract construction material. Access to widely-used products, like poles, timber, and fronds, could be facilitated by designating some forest management areas as productive forest for community needs allowing communities to plant fast-growing trees to meet their construction needs. Designated productive forests growing bamboo, rattan, and other construction materials could also create an alternative stream of income for HHs, assuming they have access to processing and markets.
- The decline in the availability of medicinal plants could have far-reaching health repercussions for the HHs. Promoting cultivation of key medicinal plants through awareness-building and community initiatives would be good practice. Establishing community-owned enterprises to prepare processed forest products including traditional medicines could give sufficient incentive to HHs to collectively conserve the biodiversity in forest areas and improve productivity of medicinal plants for self-consumption and sale. While ensuring continued availability of traditional medicines, it could also create alternative livelihoods for women, and compensate them for their time and labor.

- There are risks involved with bushmeat consumption, including the potential for outbreaks of zoonotic diseases such as Ebola and COVID-19. The hunting and sale of bushmeat is illegal in Liberia but proper enforcement is absent and high poverty rates encourage the trade. Breeding fish and poultry, and goat-rearing, could supplement HH's protein requirements. In addition, awareness of the risks of bushmeat consumption needs to be highlighted. Studies are needed on community preferences and what they think would work for them. In addition, options for implementing quality control through the regulation of bushmeat hunting should be considered.
- Investments in crop intensification and the adoption of climate-smart approaches in agriculture need to be promoted.

Recommendation 2: Promote income generation activities

- The processing and sale of forest products could be an important way to increase rural incomes. However, currently less than a quarter of HHs carry out any amount of processing. The current survey did not collect in-depth data on reasons for why this is so. Although low levels of processing may be due to a number of reasons, some immediate actions focusing on skills enhancement, basic infrastructure, and market access could be a good start (See Box 1 below for an example of good practice).

Box 1. Potential of Processing of Forest Products by Communities

Several examples illustrated how communities that began as primary producers moved further along the processing chain as their experience grew and their capacity was enhanced.

1. In Mexico, smallholder and community-based forest enterprises have become major suppliers to hundreds and thousands of small-scale carpenters who are renovating houses with long-fiber pine and hardwoods found in community natural forests. They also supply furniture stores with finished products.
2. In Guatemala and Honduras, smallholder and community-based forest enterprises supply domestic markets with timber and non-timber forest products (NTFP), and they export sawn wood and finished wood products to Europe and ornamental non-wood forest products to the United States.

Source: Molnar et al. Community-Based Forest Management. The Extent and Potential Scope of Community and Smallholder Forest Management and Enterprises. The Rights and Resources Initiative. 2011.

- Skills development enhances the ability of people to take advantage of income generation activities. Training centers should be established to learn skills related to processing forest products into higher-value commercial products. This could be backed up with financial support to organize communities or cooperatives to reap economies of scale in the production and marketing of these products and to more easily access markets.
- Value addition of forest products is important for sustainable livelihoods and income generation. Transforming these products into viable produce for sale would create more income generating activities. A complementary in-depth analysis should be undertaken to explore the value addition potential of forest products further, with a focus on maximizing value-addition at the same time as ensuring the long-term sustainability of their supply. This analysis should also identify the key constraints to fully realizing the value chain and how these could be addressed.

- Small-scale gold mining is a highly lucrative source of income across the country. Policy and law makers need to be aware of the importance gold has for these vulnerable communities and develop regulations for gold mining activities, including developing safe extraction practices to protect the health of the miners and the environment and rolling out training on these practices for small-scale miners.

Recommendation 3: Recognize the social safety net function of forests in planning and implementation of strategies to fight economic downturns and other national crises

- In times of crises, the contribution of forests as a source of subsistence needs, especially food is indisputable. This fallback behavior of HHs can lead to over-extraction and unsustainable forest use. Thus, special attention should be paid to expanding the coverage of social protection systems among these extremely poor HHs. In addition, it is important to promote their productive inclusion in available economic activities, to counter the pressures of unsustainable forest use and to preserve the safety net role of forests for future needs.

Recommendation 4: Remove gender biases

- Greater participation by women in decision-making regarding forests should be promoted. This should include encouraging women to chair meetings and to voice issues that are of central interest to them. It is also important to understand the barriers to women participating more actively in these meetings.
- Another issue is how the numbers of women entrepreneurs can be increased so that their skills and innovative talents can be harnessed to generate income and bring about greater gender equality and female empowerment. Best practice examples from other countries could be adapted to the Liberian context (See Box 2 below).

Box 2. Trees and Forests are Key to Fighting Climate Change and Poverty. So are Women.

1. In Brazil, supporting women's NTFP microenterprise groups resulted in increased incomes and empowerment, as well as a reduction in deforestation. In India and Nepal, increasing women's participation in community forest management groups led to improved forest conservation and enhanced livelihoods.
2. In Uganda, a gender-transformative 'adaptive collaborative management' approach for communities resulted in tens of thousands of trees being planted by women for the first time both on-farm and in forest reserves, improved food security, and the election of 50 percent women leaders in forest management groups.
3. In Kenya, the Green Belt Movement launched by Nobel laureate Wangari Maathai, with women's empowerment at its core, has planted over 51 million trees.[17]

Source: World Bank Blog by Patricia M. Kristjanson. Trees and forests are key to fighting climate change and poverty. So are women. March 2019.

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17 See: http://www.greenbeltmovement.org/

Recommendation 5: Strengthen the governance of resource collection at local level

- Formal and informal rules relating to the collection of forest products support sustainability and can prevent a situation where individual users fail to work collectively to protect this important resource, that is averting a 'tragedy of the commons'. Since knowledge of these rules varies across products, and regional clusters, it is important to raise awareness across all communities. It should also be ensured that these rules allow for an equitable sharing of benefits among HHs. Box 3 presents some globally recognized benefits of community management of forests.[18]

Box 3. Community Organization for Forest Management

Numerous studies have found deforestation rates in community managed forests to be comparable and sometimes lower to uninhabited protected areas. Local participation in forest management has also provided dual benefits of increasing both forest carbon stocks and livelihood opportunities, although trade-offs remain. By recognizing local communities' roles in enhancing forest ecosystem service provisioning, coupled with multiple instances of states failing to manage forests sustainably, national governments are progressively allocating community-based forest ownership.

Source: Lin, T., K. T. Htun, D. Gritten, and A. Martin. 2019. An assessment of the contribution of community forestry to climate change adaptive capacity in Myanmar. International Forestry Review

Recommendation 6: Increase the coverage of sustainable forest management programs

- Programs on sustainable forest management are recognized by communities to provide many benefits. However, coverage of these programs is low and declining. There is a need to explore why the coverage of these programs is in decline. In addition, they need to be scaled up to build the long-term skills, competence and overall capacity of communities to manage their forest resources sustainably. Communities in remote locations should be a special focus of these programs.

Recommendation 7: Improve the database and monitoring of economic progress

- There is a need to regularly carry out surveys such as the Liberia NHFS. This should happen at least once every three years. This would validate existing information, gather new information and allow the monitoring of the economic progress of rural HHs. There is good potential of including collection of such socio-economic data in the regular National Forest Inventory.

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18 Lin et al. 2019.

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SETTING THE SCENE: FORESTS AND THE FOREST ECONOMY[19]

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19 This section draws heavily from the Liberia Country Forest Note (Hooda et al. 2018).

1.1 LIBERIA'S FORESTS

Liberia is one of the most forested countries in West Africa, with more than two thirds of its land surface covered by forest. The National Forest Inventory, conducted in 2018 and 2019, estimates the forest cover in Liberia to be 6.69 million hectares which is approximately 69 percent of the total landmass.[20, 21]

Liberia has made a commitment to designate 30 percent of its forests as Protected Forest Areas Network, together with conservation corridors. About a quarter of the forest area is for commercial timber production. The non-designated category is about 45 percent of the forest area and this land is used in a variety of ways by communities, smallholder cultivators, and transitory populations.

Liberia's formal (measured) forest contribution to the national economy runs between nine and 10 percent of gross domestic product. Forestry is the fourth largest contributor, after services, agriculture and fisheries, and mining and panning.[22] According to the 2015 Forest Resources Assessment produced by the Food and Agriculture Organization of the United Nations (FAO), around 10,400 people were formally employed by the sector.[23] However, the formal sector is just a small part of the story.

1.2 FORESTS AND LIVELIHOODS

Informal, and largely unmeasured, forest activities provide an important source of jobs and incomes for rural Liberians. This informal sector provides incomes and employment through activities such as chainsaw milling and charcoal production. The informal chainsaw milling sector provides between 19,000 and 24,000 permanent jobs to both urban and rural individuals. The annual revenue generated by chainsaw milling alone is estimated to be US$31–41 million, or about three to four percent of Liberia's gross domestic product.[24] Charcoal demand in Liberia was estimated at US$46 million in 2018. The industry is thought to employ up to 28,000 people on a 'full-time equivalent' basis. However, in practice many more are employed due to seasonal or part-time involvement.[25]

The informal collection and use of non-timber forest products (NTFPs) are also important for forest communities. They provide a source of livelihood and food for much of Liberia's rural population, including fruits, plants, nuts, meat, and honey. NTFPs, such as rattan, are used for making furniture, and they are also a source of traditional medicines. Several NTFPs have been identified as having market potential which could be further developed.

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20 Liberia Forestry Development Authority. National Forest Inventory Report (Validated Report). 2020.

21 In 2018, Liberia established a formal country specific definition of Forest which was developed and validated by the stakeholders and approved by the Board of the Forest Development Authority (FDA). For the purposes of the inventory and all forest related activities to follow, Forest is defined as an area of land that: (a) Has a canopy cover of minimum 30 percent; (b) Contains trees with a minimum of five meters height or the capacity to reach it; and, (c) Covers a minimum of 1 hectare of land. The definition includes shifting cultivation in its fallow phase (in so far as the threshold values are met) but does not include land with predominant agriculture use such as oil palm and rubber.

22 CBL 2019.

23 FAO 2015.

24 USAID 2015.

25 Hooda et al. 2019

1.3 COVID-19

The COVID-19 pandemic, currently raging worldwide, puts an added spotlight on the household (HH) dependence on forests and their sustainable management. Forests have been shown to provide important safety-nets in terms of various crises such as floods, droughts, fires, food shortages, and most recently in the case of pandemics, when the economy is going through a severe economic downturn. HHs fall back on forests to meet their basic minimum needs. At the same time forests need to be managed sustainably and deforestation controlled, to minimize the risk of outbreaks of zoonotic diseases such as malaria, Ebola, severe acute respiratory syndrome, and Zika virus disease.

1.4 WHY CONDUCT A NATIONAL HOUSEHOLD FOREST SURVEY?

Traditional data collection approaches often overlook the contribution forests make to forest-dependent HHs. For example, the Household Income and Expenditure Survey (HIES) only collects information related to use of wood as an energy source for HHs.[26] As mentioned above, in Liberia, the informal contribution of forests to the economy is perceived to be quite large, and forest-based activities are considered to provide a significant source of rural HH incomes. The safety-net function that forest products provide can also be important during times of crisis.

Despite its widely perceived importance, the value of forests is often unmeasured or underestimated at best. Without detailed data on the magnitude and multiplicity of the interactions between HHs and the forest, policy makers will not be equipped with the information needed to understand the full spectrum of income sources, the vulnerability of forest-proximate HHs, or the risk of exploitation of the forests, which in turn affects the livelihoods of rural communities.

This gap in knowledge can be addressed using HH-level and community-level data collection.[27] An integrated survey, which collects data on forest use in combination with other aspects of livelihoods and incomes, allows a greater understanding of the importance and use of forests. It also provides the information needed to craft policy reforms to ensure future sustainable use. The Liberia National Household Forest Survey (NHFS) was implemented precisely to close this data gap.

Data on HHs and community interactions with forests are lacking in many countries, not only Liberia. The Liberia NHFS builds on the standard guidance and tools as well as on similar surveys earlier undertaken in Armenia, Georgia, and Turkey. The experience and analysis from the Liberia NHFS can provide a useful example for other countries. It offers an example of how to implement a survey, through the sharing of questionnaire instruments and operational lessons learned. It also presents findings that can serve as a motivation to countries seeking to collect similar HH-level data on forest usage for their own policy reforms.[28]

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26 LISGIS 2016.

27 The modules in the HH questionnaire have a quantitative emphasis and aim to reconstruct a measure of full income that can be used as a key indicator of forest and wild product contribution to HH welfare. Modules in the community questionnaire provide the necessary supporting contextual information on the study sites. The community questionnaire relies on a community focus group discussion, where participants are asked to reach a consensus on the use of certain important products. Gathering information in a collective qualitative manner allows the capture of the importance of products at community level that goes beyond quantitative contributions.

28 Similar surveys have been undertaken in three other countries, Armenia (Cerbu et al. 2020), Georgia (World Bank Group. 2018) and Turkey (World Bank Group. 2017), with a focus on fuelwood dependence, forest-poverty-livelihood linkages, and, forests-poverty-migration, respectively. The findings and recommendations from these studies were used to inform national forest policy reform in these countries.

2

THE LIBERIA NATIONAL HOUSEHOLD FOREST SURVEY (NHFS)

The Liberia National Household Forest Survey (NHFS) was implemented through a collaboration between the World Bank, the Forestry Development Authority (FDA) and the Liberia Institute of Statistics and Geo-information Services (LISGIS). The NHFS was conducted across all counties in Liberia, with the exception of Greater Monrovia, between September 2018 and January 2019. Its aim was to collect detailed data on the interactions between households (HHs), communities and the forest through the implementation of HH and community questionnaires which integrated the collection of forest use and socioeconomic data.

The survey collected details on the patterns of forest use by forest-proximate HHs and communities across the country.[29] The data collected through this survey can help to answer several questions, including:

- What proportion of total HH income comes from forests?
- What types of forest products are collected and when?
- What is the extent of local processing of forest products?
- How much of the forest products collected or processed is for self-consumption, and how much for sale and trade?
- Do forests perform a safety net function during and after periods of shocks?
- What are the local rules governing the use of forests?
- What is the role of women in decision-making related to forest use at the community level?
- Who runs forest-based enterprises?
- How important and prevalent are the environmental services from forests?

The data collected through this survey help provide a better understanding of the contribution that forest ecosystems and products in Liberia make to the livelihood, income, and well-being of HHs residing in or near forested areas. The survey gathered information not just on the HH use of wood, but on many other products found in the forest on which HHs depend upon for their daily existence. These included food products such as bush yam and bushmeat, construction materials such as palm thatch and fronds, medicinal plants, and goods and products such as fish, minerals and ores, found in the forest areas. The results of this survey also provide insights on the potential of forests as pathways out of poverty, and in the development of policies and investments.

This section provides a brief description of the NHFS survey operation. A more detailed discussion on the survey methodology and implementation strategy can be found in Annex 1. NHFS Survey Implementation.

2.1 SURVEY INSTRUMENT DESIGN

The NHFS survey instrument was based on the publicly available National Socioeconomic Surveys in Forestry guidebook[30] and set of specialized forestry modules. These were developed jointly by the Living Standards Measurement Study (LSMS) team of the World Bank[31], the World Bank's Program on Forests (PROFOR), the Food and Agriculture Organization of the United Nations (FAO), the Center for International Forestry Research (CIFOR), and the International Forestry Resources and Institutions Network.[32]

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29 Forest-proximate HHs are those residing in EAs which are less than 2.5 kilometers from the nearest forest.
30 http://www.fao.org/forestry/forestry-modules/en/.
31 See: http://surveys.worldbank.org/lsms/about-lsms.
32 National socioeconomic surveys in forestry: Guidance and survey modules for measuring the multiple roles of forests in HH welfare and livelihoods (FAO. 2016). Downloadable at: http://www.fao.org/forestry/forestry-modules/en/.

The guidebook modules, originally designed for universal adoption, were adapted to the Liberian context. Borrowing from the Liberia Household Income and Expenditure Survey (HIES) instruments[33], they were then supplemented with several modules on income to allow for computation of total HH income. In addition, the NHFS team developed a questionnaire module on gender-related aspects of forest enterprises and forest-related community participation.

The NHFS survey consisted of:
1. A HH questionnaire, administered to 12 selected HHs in each enumeration area (EA)[34], and
2. A community questionnaire, administered to a group of members from the EA.

Each questionnaire was administered using computer-assisted personal interviewing (CAPI) with CSPro[35] software.

The topics covered in the two questionnaires are summarized in Figure 2.

Figure 2 | NHFS Survey Modules

Household
- Household member details
- Forest resource base
- Forest benefits
- Forests and household health
- Forests and household energy
- Income from collected forest products
- Income from processed forest products
- Labor
- Household land
- Household cropping activities
- Non-farm enterprises (including forest-related enterprises)
- Other forest and non-forest income
- Assets
- Food security
- Shocks and coping mechanisms
- Housing
- Forests and construction
- Forest clearance

Community
- Seasonal forest usage patterns
- Forest governance
- Key forest products
- Pricing of forest products
- Community benefits
- Forest enterprises by gender
- Community participation in forest-Related programs by gender

Photo Sources: World Bank Flickr[36]; Anushree Shetty

The list of forest and wild products included in the NHFS survey is provided in Annex 3.

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33 LISGIS 2016.
34 EAs are the smallest administrative division used for census and other statistical operations. EAs in Liberia have an average of 96 HHs each (103 for urban EAs and 88 for rural EAs). The source for EA averages was LISGIS. 2016.
35 See: https://www.census.gov/data/software/cspro.html
36 https://www.flickr.com/photos/worldbank/19410973704/in/album-72157649173120547/

2.2 THE SURVEY SAMPLE

Given the focus of the NHFS on the population living in close proximity to forests[37], a first step was to clearly define forest for the purposes of the survey. Building on the national definition of forest used in Liberia, the NHFS employed the following definition:

Forest =   area with at least 30 percent tree canopy cover, with trees higher than 5 meters and at least 50 hectares in size[38]

The forest cover was determined using high-resolution forest cover data produced in 2019 based on satellite information on forest cover in Liberia for 2015.[39] All EAs within 2.5 kilometers of forests identified with this definition were deemed eligible for inclusion in the NHFS.[40] EAs from the Montserrado county (part of Greater Monrovia) were excluded from the sample due to the high rate of urbanization. However, rural parts of Montserrado county were included in the sample.

The second critical component of the NHFS sample was the selection of EAs and HHs.[41] A total of 250 EAs that fell within 2.5 kilometers of forests were selected. In each of those EAs, a HH listing operation was carried out, and 12 HHs were randomly selected within each EA.

The full sample consisted of 3,000 HHs across a total of 250 EAs that fell within 2.5 kilometers of the nearest forest. Only three of these EAs were classified as urban.[42]

The EAs were grouped into three clusters of counties. The three key dimensions (and their indicators) in which the clusters differed were:
1.   The extent of forest cover and its quality (percentage areas under three classes of crown density)
2.   Vulnerability to forest loss and degradation (population density, road density, and the presence of forestry, agriculture and mining concessions)
3.   Overall socioeconomic development (poverty rate and urbanization percentage).
(Refer to Section 4 below and Annex 2, for details on the dimensions and their indicators).

In addition, clusters were chosen to have similar intrinsic and exogeneous factors relevant to the interaction between HHs and forests. Each cluster covered a number of counties. See Table 1.

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37 The survey focused on forest-proximate HHs as these would likely be the most dependent on forest and also the HHs for which the contribution of forests to livelihood and incomes would likely be most imperfectly measured in traditional data collection approaches.

38 In addition, any forest patch with a perimeter to area ratio more than 0.02 was excluded. This restriction was imposed to focus on non-fragmented and relatively large forest areas capable of providing both consumptive and non-consumptive goods and services.

39 Metria and Geoville. 2019

40 Distance from enumeration area to the nearest forest is computed from the centroid of the enumeration area.

41 The word 'household' refers to people who live together and share income and also basic needs. In other words, residents of a HH share the same center of production and consume from that center.

42 In Liberia, localities having a population of less than 2,000 are classified as rural, while those having 2,000 or more are classified as urban areas. However, regardless of population size, localities are classified as urban if they are county capitals or other important towns. The three EAS in our sample were classified as urban because they included important towns.

Table 1

Table 1 | The Cluster Locations in Liberia

Clusters/16	Counties
Western Cluster	Bomi
	Gbarpolu
	Grand Cape Mount
	Lofa
Central Cluster	Bong
	Grand Bassa
	Margibi
	Rural parts of Montserrado
	Nimba
Eastern Cluster	Grand Gedeh
	Grand Kru
	Maryland
	River Cess
	River Gee
	Sinoe

Figure 3 | Liberia NHFS Forest Cover in the Three Clusters[43]
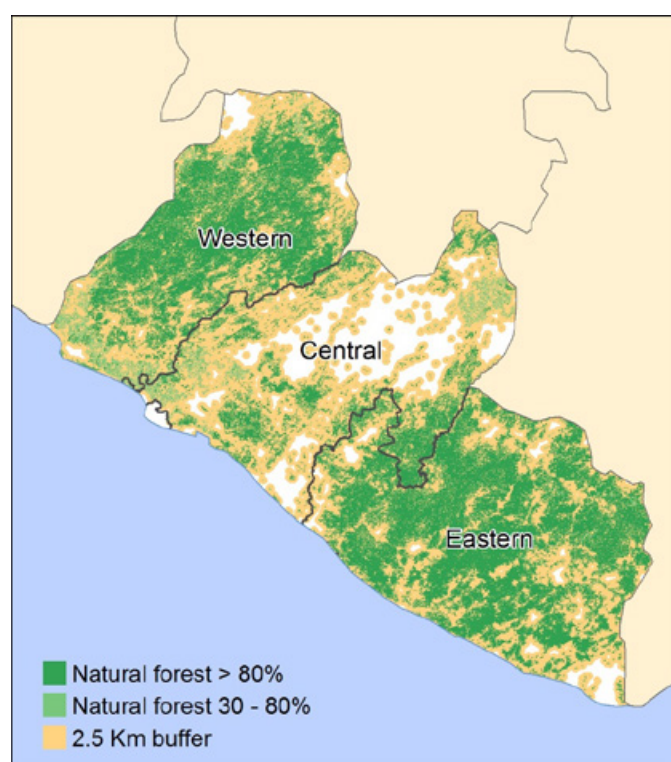
Source: Metria and Geoville. 2019.

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43   The white areas in Figure 3 were excluded from the NHFS sample, as they lie outside the 2.5 kilometer buffer.

The final survey sample is presented in Table 2 below. The HH sample weights used throughout this document have been:

1. Calibrated to reflect the population of all EAs within 2.5 kilometers of forest in the above-mentioned clusters, and
2. Adjusted to the population counts of the more current estimates of the 2016 Liberia HIES.

All tables and figures presented in this report are estimated using these sample weights unless otherwise indicated.

Table 2 | Distribution of EAs and HHs Across the Three Clusters

Clusters	No. of HHs in Population (weighted)	No. of HHs in Sample (unweighted)	No. of EAs in Population	Sampled EAs[46]
Western Cluster	126,656	936	1,200	78
Central Cluster	226,585	1,089	2,893	91
Eastern Cluster	117,381	961	954	81
Full NHFS	**470,622**	**2,986[47]**	**5,047**	**250**

By design, sampled EAs were in close proximity to the forest, and the center points of the EAs were within 2.5 kilometers of the nearest forest. More variation is observed in the distance from HH to nearest forest. However, EAs, particularly in rural areas, can be large and the center point of an EA may lie far from the HH location. In all three clusters, the majority of HHs (88, 66, and 71 percent respectively) lived within one kilometer of forests. See Table 3. However, the distance between HH and forest did vary from 0 to 5.6 kilometers in Western Cluster, 0 to 11.2 kilometers in Central Cluster, and 0 and 3.2 kilometers in Eastern Cluster.

Table 3 | Distance from HH to Nearest Forest (Kilometers)

Clusters	Mean	% of Households within 0.25 Km	% of Households within 1 Km	% of Households within 2 Km
Western Cluster	0.42	49%	88%	99%
Central Cluster	0.93	35%	66%	90%
Eastern Cluster	0.77	27%	71%	97%
Full NHFS	**0.75**	**37%**	**73%**	**94%**

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44 LISGIS. 2016
45 For details on the computation of sampling weights, refer to the Liberia NHFS Basic Information Document.
46 However, five community questionnaires were unusable and are therefore not reflected in the tabulations of community level data.
47 Fourteen HH questionnaires were unusable.

2.3 COLLECTING DATA ON INCOME

The survey data were used to collect information on aggregate income. This included information on different sources of income, such as wage employment (both agricultural and non-agricultural, forest and non-forest), self-employment, crop, forestry and mining production, cash and in-kind transfers from relatives and friends, and other sources of income, such as non-labor earnings. Data on income from livestock and fisheries were not captured in the Liberia questionnaire.

The comprehensive measure of HH income provided in this report follows the Rural Livelihoods Information System (RULIS) guidelines.[48] This is based on the resolution concerning HH income and expenditures statistics adopted by the 17th International Conference of Labor Statisticians. Some adaptations were done in order to accommodate and provide detailed information on the forestry and mining sectors, that are the major sources of income in Liberia.

Data collection on aggregate incomes allow us to demonstrate the importance of forest activities to all HHs, including those who are not directly involved with forest products and activities.

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48 For more information on the RuLIS methodology, visit the website here: http://www.fao.org/in-action/rural-livelihoods-dataset-rulis/en/.

3

THE CLUSTERS AND HOUSEHOLDS
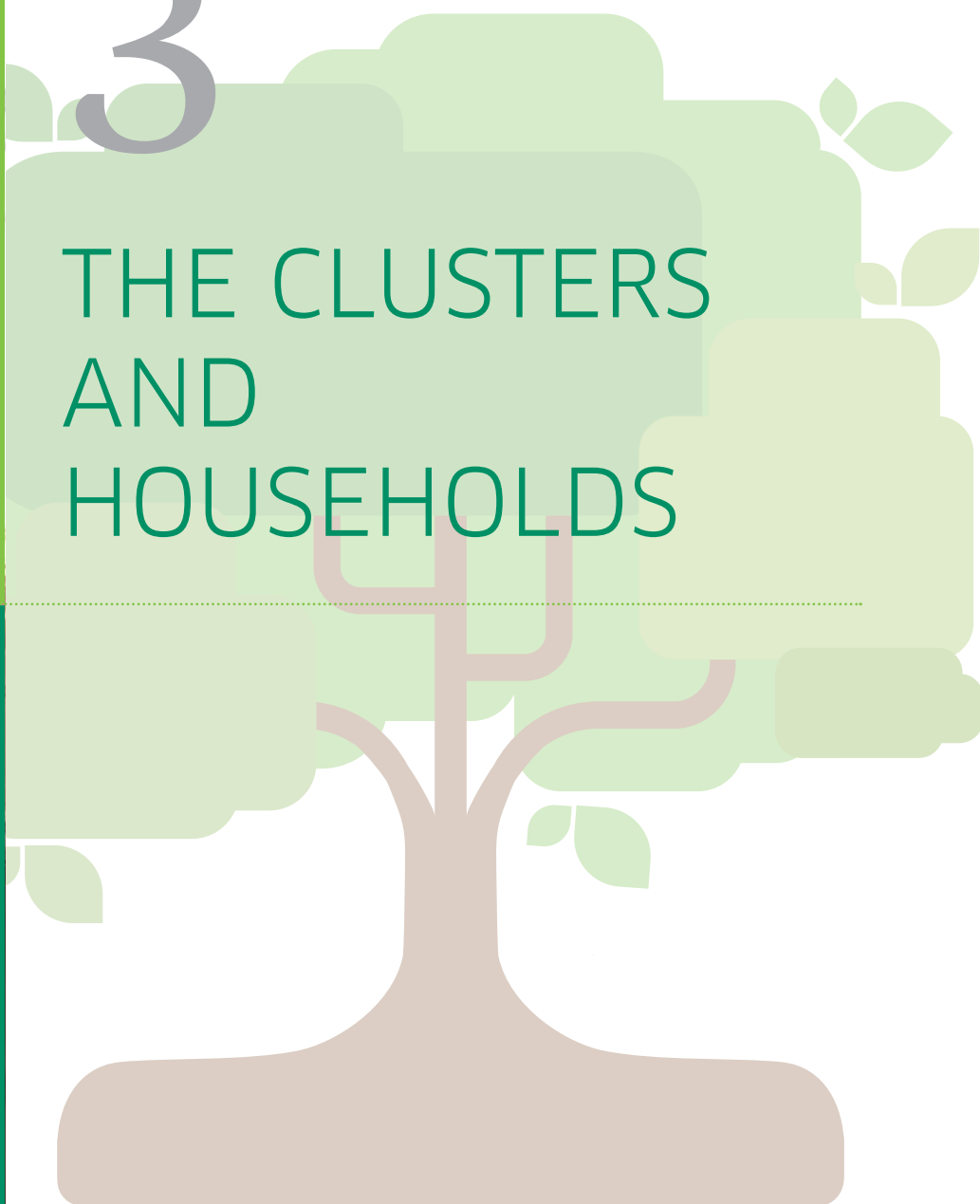
The interactions between HHs and forests are influenced by many factors. The proximity to forests is just one factor. Others are both intrinsic to a HH (such as family income, family size, age of family members, and education) and also exogeneous (that is those making up the external environment in which a HH operates, such as the availability of livelihoods and jobs from industrial enterprises, the extent of urbanization, and distance of a community from a major road).

3.1 CLUSTER CHARACTERISTICS

Analysis of geospatial and other supplementary data allow for the comparison of several characteristics of the Liberia National Household Forest Survey (NHFS) clusters. The figures below are not derived from the NHFS data but are included to provide context to the NHFS results discussed in the next sections. For further descriptive statistics by cluster, see Annex 2. All cluster-level figures, with the exception of poverty rates and urbanization rates, represent only enumeration areas (EAs) that are represented by the NHFS (that is EAs within 2.5 kilometers of a forest, using the definition of forest-proximate in Section 3).

In Liberia, high population density, shifting cultivation, roads and the presence of forestry, agriculture and mining concessions are considered as significant pressures resulting in deforestation and forest degradation. Below we describe how the clusters differ on population density, road density, concessions, poverty levels and urbanization.

Level of Forest Density

As illustrated in Figure 3, the three clusters have differing levels of dense forest with over 80 percent tree canopy.
- Eastern Cluster has the highest percentage of area covered in dense forests (58 percent).
- Western Cluster has 53 percent.
- Central Cluster has the lowest percentage of area covered by dense forests (22 percent).

Population Density

- Central Cluster had the highest population density (19.72 people per square kilometer), potentially related to its proximity to Monrovia.
- Eastern Cluster had a lower population density (4.28 people per square kilometer) and Western Cluster the lowest (2.75 people per square kilometer).

Road Density

- The Central and Eastern Clusters have a similar major road density (approximately 1.9 kilometers of road per 100 square kilometers).
- Western Cluster has a lower major road density with approximately 1.4 kilometers of road per 100 square kilometers.

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49 Poverty rates are not available at the EA (enumeration area) level. Therefore, the cluster-level statistics include all EAs in the relevant counties, not only those within 2.5 kilometers of forests.

Concessions

The existence and type of concessions varies across clusters:

- Western Cluster has two agricultural concessions, seven forest concessions, and 106 mining concessions.
- Central Cluster has six agricultural concessions, 12 forest concessions, and 115 mining concessions.
- Eastern Cluster has zero agricultural concessions, 27 forest concessions, and 68 mining concessions.

Poverty Levels

The percentage of population below the official poverty line is highest in Eastern Cluster at 69.1 percent, followed by 64.5 percent in Central Cluster, and 63.5 percent in Western Cluster.

Urbanization

The degree of urbanization is measured by the percentage of population found in cities. The Eastern Cluster had the highest percentage of urbanization at 17.2 percent, followed by Central Cluster at 14.9 percent and Western Cluster at 12.3 percent.

Figure 4 | Liberia NHFS Forest Cover, Poverty and Urbanization in the Three Clusters
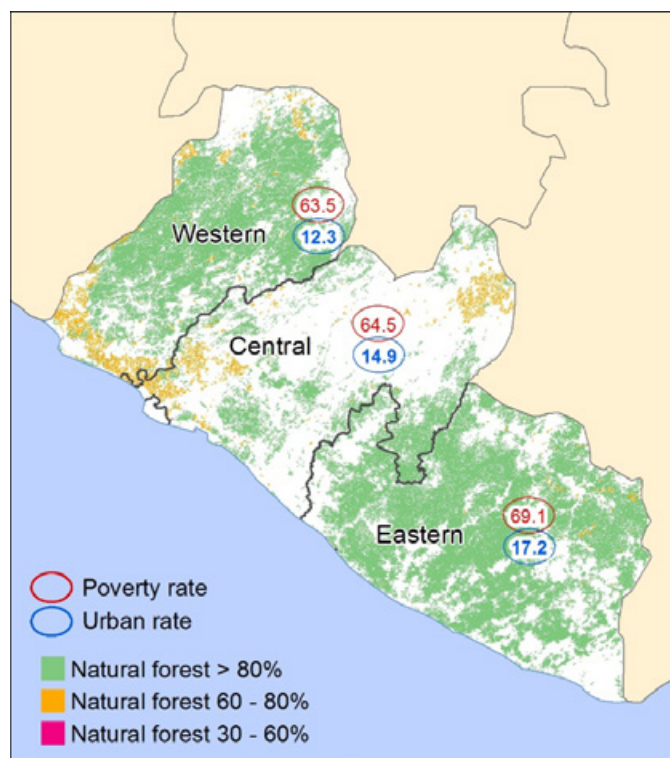
3.2 NHFS HH CHARACTERISTICS

The key features of those surveyed in the NHFS were:

The average age of all individuals in the HHs surveyed	26 and 28 years
Female headed HHs	24 percent
Average numbers of individuals in a HH	4
Mean individual age	27 years old
Mean education of all adults (>=18 yrs.	2.72 years
Average time taken to walk to the nearest forest	62 minutes

For more details, see: Figure 5.

Figure 5 | HH Characteristics by Cluster

Average Number of People per HH

Western	Central	Eastern	Full NHFS
3.6	4.0	4.5	4.0

Female Headed HHs (%)

Western	Central	Eastern	Full NHFS
32%	22%	18%	24%

Walking Time to Nearest Forest (Mins)

Western	Central	Eastern	Full NHFS
62	63	57	61

Mean Individual Age (Years)

Western	Central	Eastern	Full NHFS
28	27	26	27
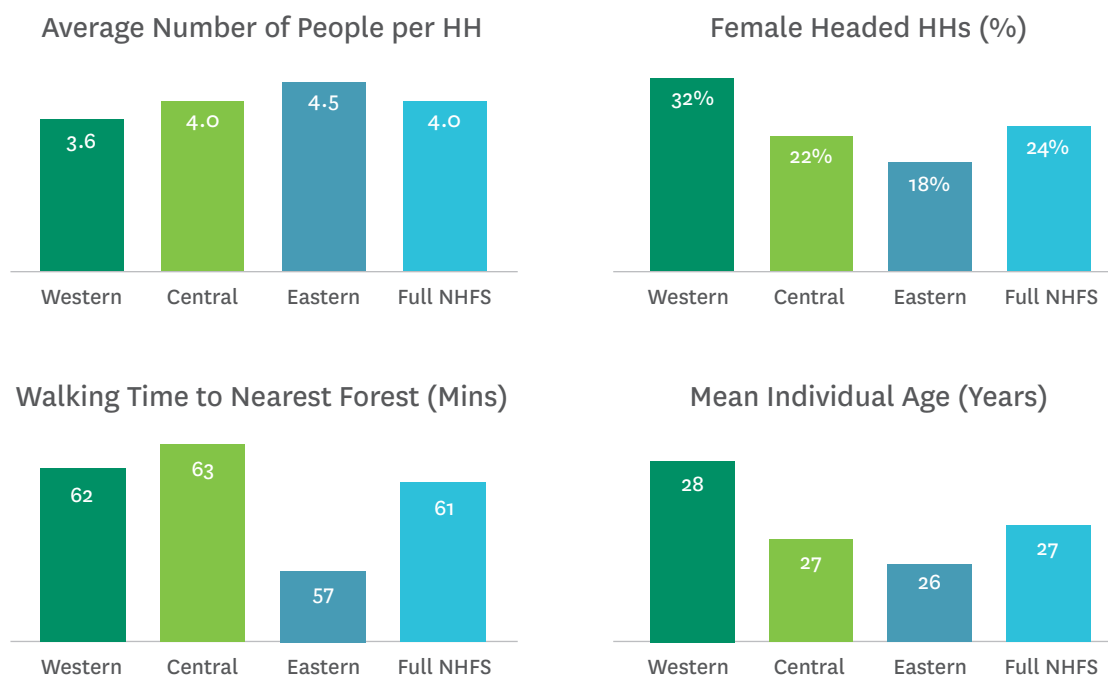
Mean Years of Schooling (All Adults)

2.72

4

PEOPLE AND FORESTS IN LIBERIA – SURVEY RESULTS
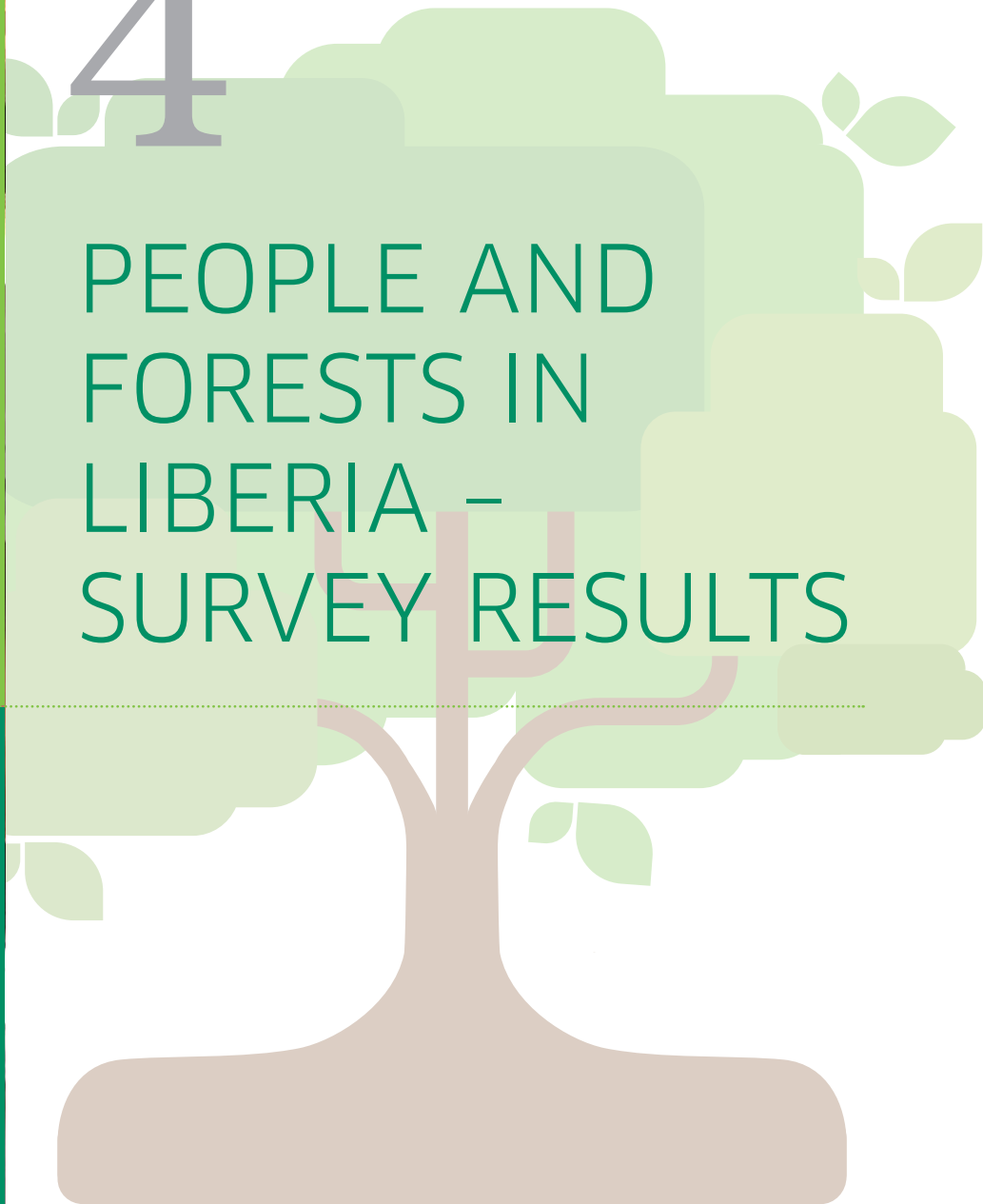
4.1 HOUSEHOLD INCOME FROM FORESTS[50]

As Table 4 shows, on average 35 percent of total income of all HHs is generated from forest products. This contribution varies across clusters, averaging 27 percent in Western Cluster, 40 percent in Central Cluster and 32 percent in Eastern Cluster. If we consider the subset of only those HHs that responded positively to participating in forest products collection and trade, the percentage contribution rises to 50 percent.

The importance of forests to rural HHs in Liberia is strongly evidenced by these data.

See Table 4 and Table 5.

Table 4 | Mean Income and Income Shares for all HHs (Weighted, USD**)

	All HHs		
	Aggregate HH Income	Income from Forests*	% of HH Income from Forests*†
Western Cluster	470	117	27%
Central Cluster	737	249	40%
Eastern Cluster	1213	257	32%
Full NHFS	**783**	**215**	**35%**

** US$/LRD = 157.9, from November 2018

* This definition excludes income from forest-related businesses. It also excludes gold and other mineral collection and processing.

† Share of income column excludes 44 observations which had < 0 or >100 percent of income from forests, possibly due to losses in one or more income categories. Means are presented as means of HH-level shares of income from forests.

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50 The survey data were used to calculate aggregate incomes, using the Rural Livelihoods Information System (RuLIS) methodology as explained earlier.

Table 5

Table 5 | **Mean Income and Income Shares for HHs Involved with Forest Activities (weighted US$**)**

HHs Involved with Forest Activities				
	% of HHs Participating in Forest Activities	Aggregate Household Income	Income from Forests*	% of HH Income from Forests*†
Western Cluster	61%	591	192	45%
Central Cluster	71%	795	353	56%
Eastern Cluster	77%	1343	334	42%
Full NHFS	**70%**	**898**	**310**	**50%**

** US$/LRD = 157.9, from November 2018

* This definition excludes income from forest-related businesses. It also excludes gold and other mineral collection and processing.

† Share of income column excludes 44 observations which had < 0 or >100 percent of income from forests, possibly due to losses in one or more income categories. Means are presented as means of HH-level shares of income from forests.

4.2 HOUSEHOLD RESPONSES

HH and Forest Interactions

Whilst the overall significant contribution of forests to household incomes is solidly established by the data, it is important to get a sense of the interactions between HHs and forests at a disaggregated[51] level. Questions that needed answers to included:

- What types of forest products did HHs collect and trade?
- Who collected these and how much time did they spend?
- To what extent did they process and market these forest products?
- How reliant were they on forests to meet their construction, energy, and medicinal needs?
- To what extent did households rely on forests when they experienced weather-related shocks such as floods, droughts and fires?
- How did they cope with periods of food insecurity and extreme rises in food prices?
- Did forests provide them with a 'safety-net' in times of such crises?
- Did they clear forest land to grow crops?

In the rest of this section, these and other HH and forest-related interactions will be explored using the HH data collected through the survey. Answers to these questions provide critical insights for the design of policies and interventions required to improve the productivity and sustainability of forest use by HHs.

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51 Disaggregated data are data that have been broken down into a variety of categories and sub-categories in order to identify differences between individual categories rather than the overall aggregate.

4.2.1 RECOVERING FROM ECONOMIC AND NATURAL SHOCKS

4.2.1.1 Shocks and Crises

Key Results

- **61 percent** of HHs reported suffering from economic or natural shocks during the previous 12 months.
- **57 percent** of HHs reported an increase in food prices as the most frequently experienced economic shock in the last year.
- **43 percent** of HHs reported using forest products to recover from shocks.

Key Insights

Forest products are important for recovery from natural and economic shocks. Market drivers and natural events have a huge influence on the lives of HHs. In particular, increases in food prices impact on their access to food considerably and build a reliance on forest products to recover.

Survey Responses: Shocks and Forest Products for Coping

This part of the survey asked HHs on any shocks which they had experienced in the last 12 months and if they used forest products to cope with the shocks. Potential shocks included droughts, floods, crop diseases, loss of salaried employment, chronic illness, death of a family member, and destruction of the family dwelling.

Figure 6 | Percentage of HHs who Experienced Shocks
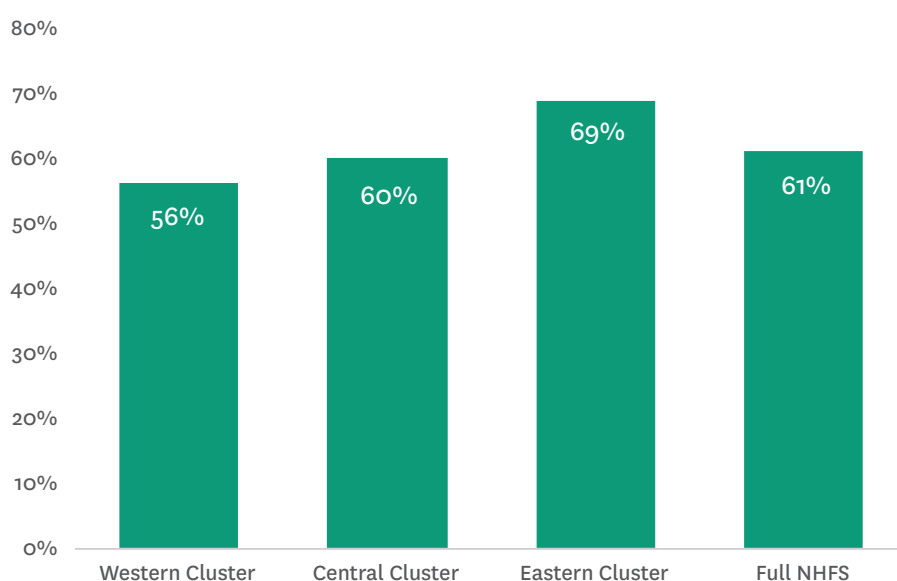
The majority of HHs (61 percent) reported suffering from some form of crisis or shock during the past 12 months. The most frequently experienced shocks included a rise in food prices, death in the HH, sickness, floods, and crop disease, in order of prevalence. Eastern Cluster suffered the most with a reported 69 percent of HHs experiencing shocks, followed by Central Cluster with 60 percent, and Western Cluster with 56 percent.

Figure 7 | Top Five Shocks Experienced in Last 12 Months (% HHs that Experienced a Shock)
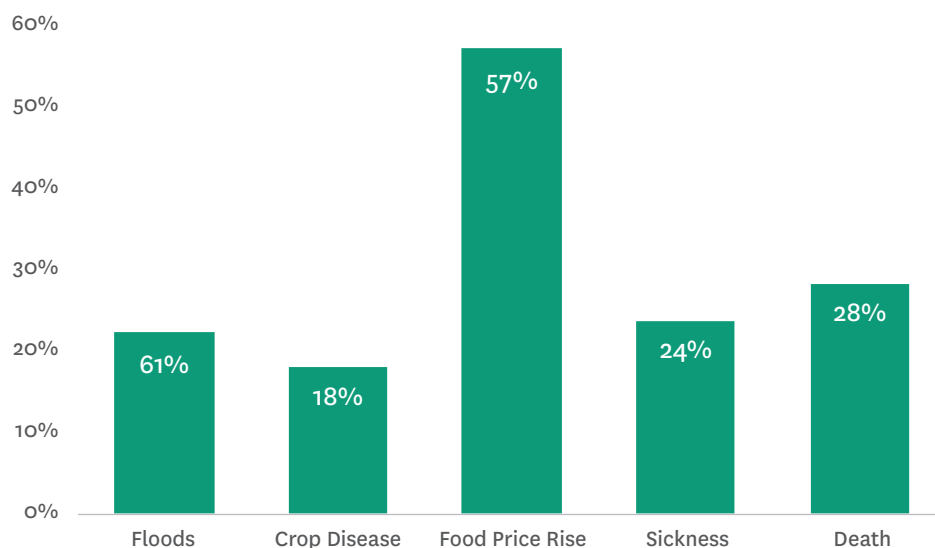
A rise in food prices was the top shock experienced by those HHs who experienced shocks (57 percent). A death of a HH member was the next top shock (28 percent). Severe illness or accident were experienced by 24 percent of HHs and floods by 22 percent of HHs. Crop disease or crop pests were felt by 18 percent of HHs. In addition, a small number (three percent) also reported shocks relating to the death of livestock.

Figure 8 | Percentage of HHs who Used Forest Products to Recover in Last 12 Months (% HHs that experienced a shock)
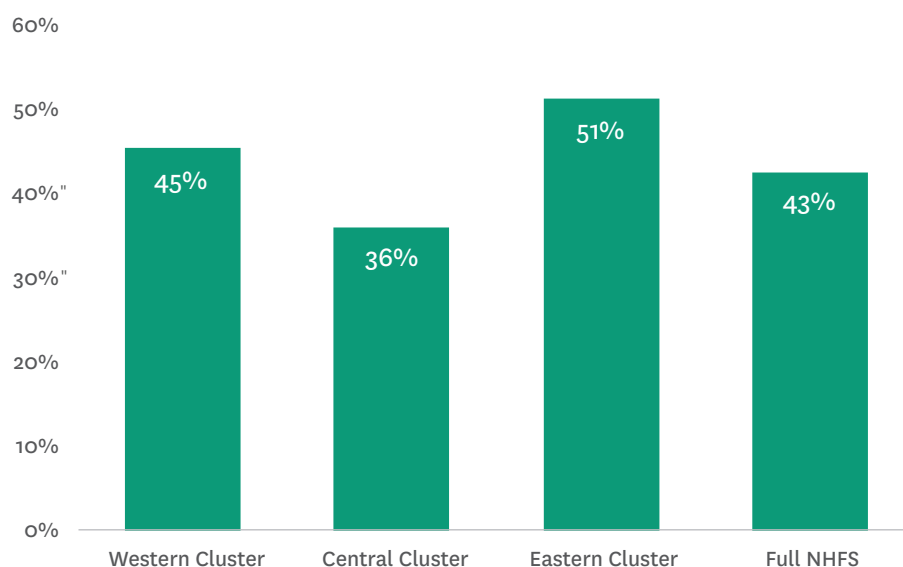
The importance of forest products to help HHs cope with economic and natural shocks was also highlighted by the survey responses. On average, nearly half of HHs (43 percent) reported using forest products to help recover from shocks. In Eastern Cluster this number was highest, with 51 percent reporting having used forest products to help cope, whereas Central Cluster used forest products less at 36 percent.

These shocks also had an impact on whether HHs could access forest products. About 41 percent of HHs facing shock or crisis reported that the shock itself hindered their access to forest products. This could have been because of sickness or death of the HH member who was responsible for collecting forest products. In addition, floods can pose a barrier to forest access.

| Figure 9 | Have Shocks Reduced Access to Forests in the last 12 months? |

Yes   No
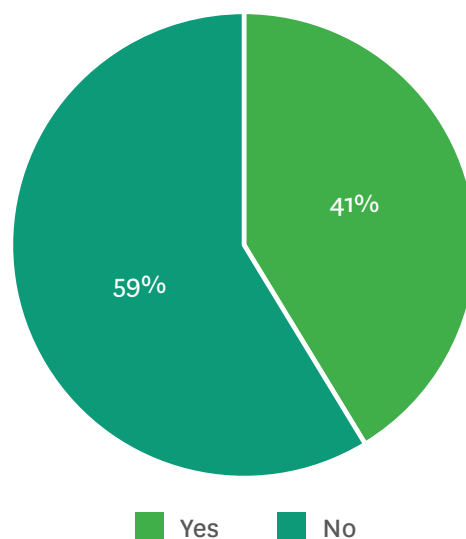
What Do the Data Tell Us?

More than half of the HHs experienced some sort of economic or natural shock in the last 12 months with food price rises being the most prevalent. In addition, a majority of HHs (57 percent) reported that they relied on forest products during times of shocks. This shows the importance of forest products as a mechanism for HHs to recover from these shocks.

Access to forest products impacts on HH vulnerability to natural and economic shocks. Given the availability of rich resources in the forests in the proximity of HHs, the forest becomes an obvious fallback for the HHs to recover from shocks. However, when the shock impedes the ability of HHs to access the forest resources, it can increase the vulnerability of HHs during these periods. HHs also used agricultural stocks, borrowed from friends and family, or searched for work to overcome these periods of shock.

The HHs in clusters located in the higher forest density areas (Western and Eastern Clusters) rely more on forest products during economic and natural crises. High density forest areas are generally more biodiverse. Forest products in high density forest areas not only provide a safety net during the period of shocks, but also ease of access and harvesting for the HHs to a variety of dietary supplements to meet their basic needs.

4.2.1.2 Food Shortage and Insecurity

Survey Responses: Use and Importance of Forest Products to Recover from Food Insecurity

Key Results

- **46 percent** of HHs did not have enough food to feed the HH at some point in the last 12 months, with the average period of food insecurity lasting approximately three months.
- **66 percent** of food insecure HHs used forest products to manage food insecurity issues.

Key Insights

- Rural HHs living in proximity to forest areas rely on forest products to meet food and income needs during periods of food insecurity.
- HHs in the cluster with the highest poverty rate rely the most on forest products during periods of food insecurity.

HHs were asked about situations when they did not have enough food to feed the HH in the last 12 months. They were also asked how important forest products were to meet their food needs during these periods of food insecurity.

All three clusters presented with high levels of food insecurity. About 46 percent of the HHs surveyed were faced with a situation in the last 12 months when they did not have enough food to feed the HH.

Figure 10 | Percentage of HHs who Experienced Food Insecurity in the last 12 months

- Yes
- No
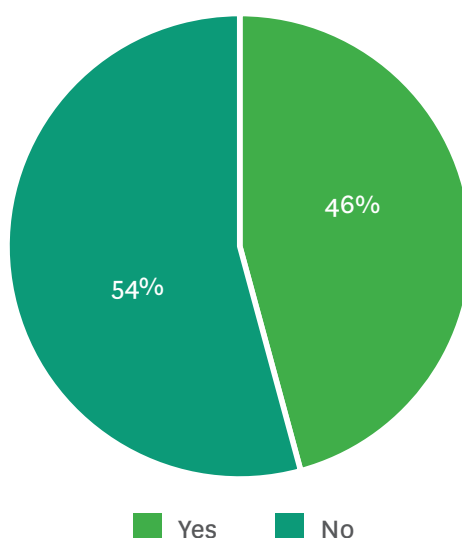
On average, periods of food insecurity lasted for about three months in all three clusters. During these critical months of food insecurity, 66 percent of these 46 percent of food insecure HHs used forest products to meet their food needs. Eastern Cluster reported using forest products the most to recover from food insecurity (76 percent). This was more than the other two clusters with Western Cluster at 59 percent and Central Cluster at 64 percent.

Figure 11

Percentage of HHs that Used Forest Products During Periods of Food Insecurity in the last 12 months (% of food insecure HHs)
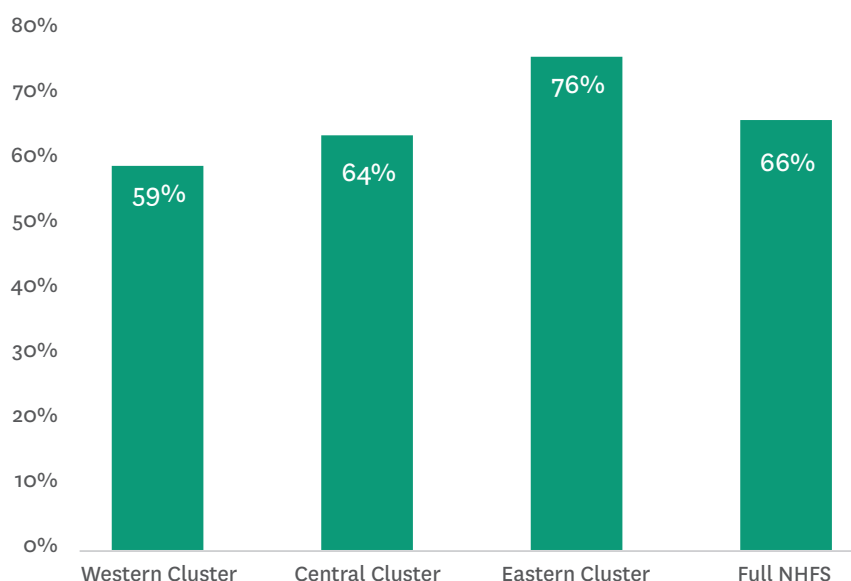
Figure 12

Importance of Forest Products During Periods of Food Insecurity in the Last 12 Months (% of food insecure HHs)
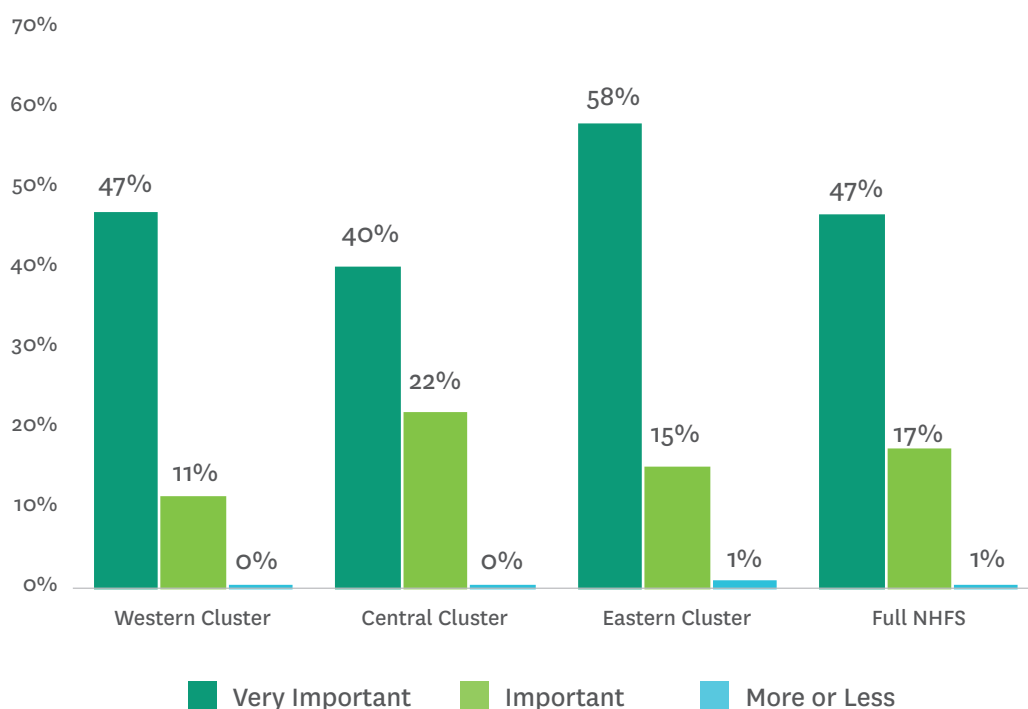
When asked how important forest products were during food insecure periods, 47 percent stated they were 'very important' and 17 percent stated they were 'important'. On average, only one percent of the HHs considered forest products to be 'more or less' important as a solution to fulfilling their basic needs during periods of insecurity. HHs were also asked whether forest products were 'non important' or 'very unimportant'. Less than one percent responded that was the case.

However, Eastern Cluster reported that forest products were particularly important during these periods. In Eastern Cluster, 58 percent of food insecure HHs stated that using forest products during times of food insecurity was 'very important'. In Western Cluster, the percentage was 47 percent and in Central Cluster it was 40 percent.

What Do the Data Tell Us?

The rich resources of the forest offer HHs a coping mechanism for dealing with periods of food insecurity. Two thirds of HHs that experienced food insecurity (46 percent) relied on forest products to meet their needs during these scarce times. More than half of the forests in Western and Eastern Clusters have more than 80 percent canopy cover, providing a range of forest products for self-consumption or sale in markets. Given the high level of poverty, these resources are relied on to recover from various types of shocks.

Collection of forest products offers a no-cost solution to meeting the food and resource needs of HHs in periods of food insecurity, which may be more attractive to poorer, more vulnerable HHs. Eastern Cluster has the highest poverty rate and a higher level of dependence on forest products during periods of food insecurity. In addition, Eastern Cluster's forests have a higher density of forest cover.

Reliance on forest products in the face of food insecurity was observed irrespective of proximity to urban centers. More than half of HHs in Central Cluster looked to forest products as an important safety net, despite being closer to urban centers and the increased potential for alternative livelihoods. When asked about the importance of forest products during these times, 40 percent said they were 'very important', and 22 percent said they were 'important'.

4.2.1.3 Coping with Food Insecurity

Key Results

- The top three forest products used to cope with food insecurity were:
  1. **Bushmeat** (11 percent),
  2. **Bush yam** (11 percent), and
  3. **Fish** (7 percent).
- Other common products used to address periods of food insecurity include mushrooms, snails, locusts, and palm cabbage.
- Only a small number of insecure HHs bought forest products during these periods.

Key Insights

- During periods of food insecurity, HHs living close to forests used a variety of forest products to meet their needs.
- Bushmeat, bush yam, and fish, the major source of HH food consumption, were mostly collected directly by the HHs, rather than purchased, during food insecure periods.

Survey Responses: Top Forest Products used During Periods of Food Insecurity

HHs were asked about the type of forest products they used to meet their food needs during periods of food insecurity. The top three forest products used during these periods were identified and HHs were asked where they got these products from, and their main use. The main uses of the forest products used in periods of food insecurity included self-consumption, sale, or both.

Figure 13 | Top Three Forest Products Used During Periods of Food Insecurity in the Last 12 Months (% of HHs)
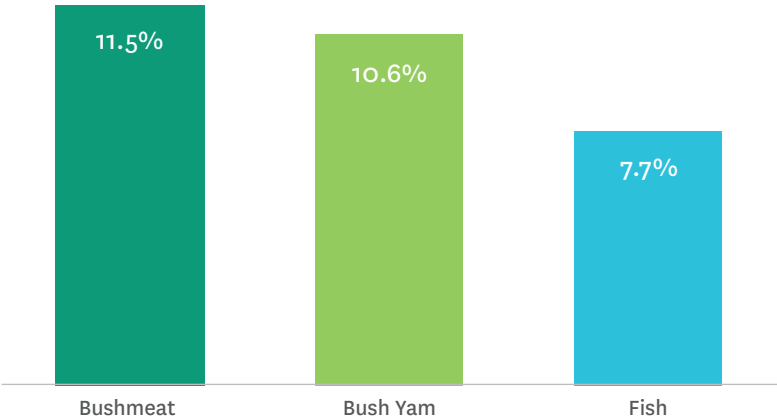
Figure 14 | Top Three Forest Products Used During Periods of Food Insecurity in the Last 12 months by Cluster (% of HHs)

Top Three Products Used
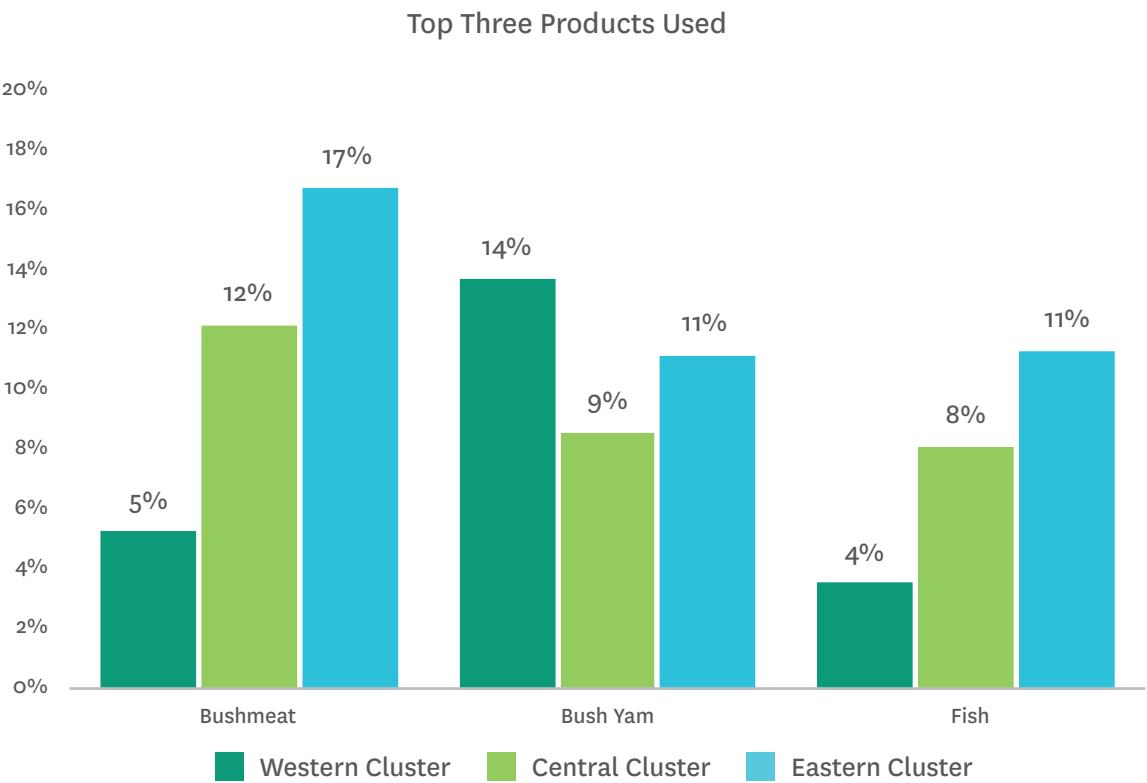
The top three forest products used by HHs during periods of insecurity were:

1. Bushmeat
2. Bush yam
3. Fish

However, other products, such as fuelwood, mushrooms, palm cabbage, bamboo, bush pepper, Makindo palm, snails and locusts, were also used by HHs during insecure periods.

Eastern Cluster used bushmeat the most during periods of food insecurity (17 percent of HHs) and more than the other two clusters. Central Cluster also used bush yam the most (12 percent of HHs) and Western Cluster used bush yam the most (14 percent of HHs).

Figure 15 | How did HHs in the Three Clusters Source These Top Three Forest Products in the Last 12 Months (% HHs that used forest products during food insecurity)?
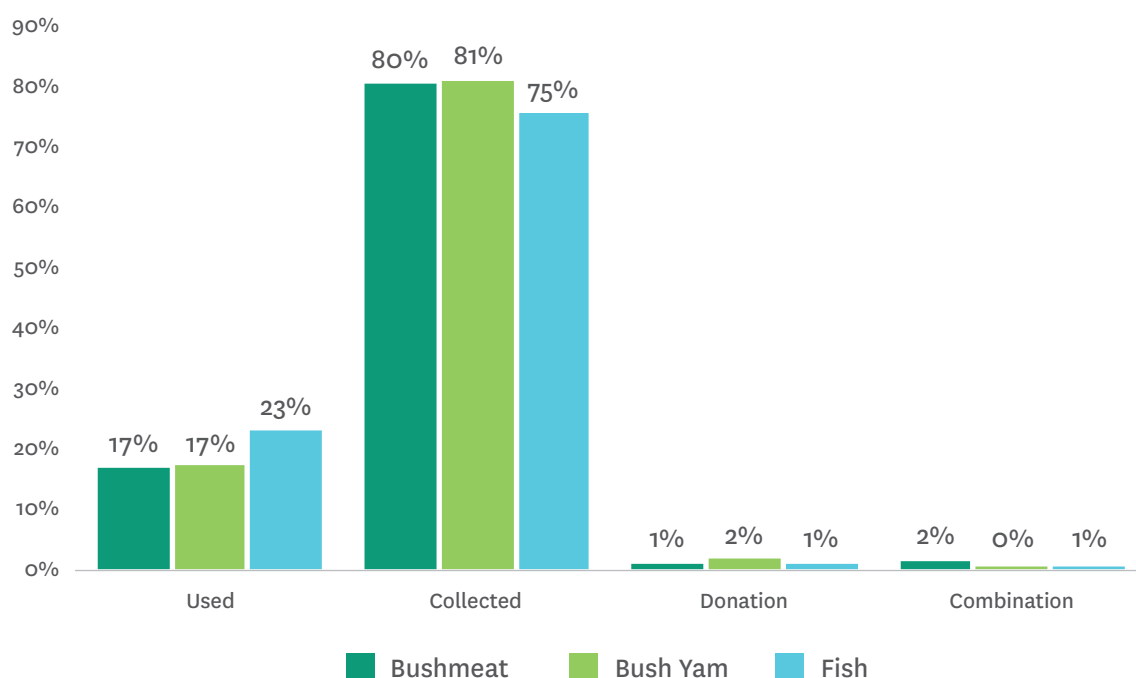
Among food-insecure HHs, 66 percent reported using forest products during periods of food insecurity and the majority collected them. Bushmeat was collected by 80 percent of HHs and purchased by 17 percent. Bush yam was similar with 81 percent collecting it and only 17 percent purchasing it. Fish was also the same. The majority collected it at 75 percent and only 23 percent bought it.

HHs mainly used these forest products to either consume at home, or for both consumption and sale. Only a negligible number of insecure HHs sourced these products just to take to market. Of HHs that used bushmeat, 67 percent of HHs sourced it for both consumption and sale, with the remaining 33 percent sourcing it only for consumption. A similar pattern emerged for HHs using fish.

What Do the Data Tell us?

During periods of food insecurity, a wide variety of forest products are used to meet both consumption and income needs. The most common products used to cope during periods of food insecurity were bushmeat, bush yam and fish. They were used either only for consumption, or to consume and to sell. Hardly any insecure HHs sourced these products just to sell. Other products, such as snails, locusts, palm cabbage, and mushrooms, and fuelwood, were also used by HHs to meet HH need in times of insecurity.

Most HHs who said they used these products during periods of food insecurity sourced them by collecting them from the forest rather than purchasing them. This highlights the importance of forests during times of food insecurity. Forests provide a source of low or no-cost resources for both food and income generation. Therefore, forest loss and the subsequent reduction in the availability of forest products will directly affect HHs who are dependent on collecting forest products.

4.2.1.4 Coping with Food Price Shocks

Key Results

- Overall **35 percent** of HHs were severely affected by increase in food prices.
- The top three forest products used to cope with food price shocks were: **bushmeat**, **bush yam**, and **fish**.
- **43 percent** of HHs confirmed that forest products were important in some way to helping them recover from food price shocks.

Key Insights

- HHs with the highest poverty rate had the highest dependence on these products in coping with food price shocks.
- Of those HHs that collected bushmeat, more than half used it for self-consumption as well as for sale. However, fish and bush yam were used more for self-consumption.

Survey Responses: Importance of Forest Products to Recover from Food Price Shock

HHs were asked how increases in food prices affected them and how useful forest products were to help them recover from food price shocks.

Figure 17 | Percentage of HHs Negatively Affected by Food Price Shocks in the Last 12 Months
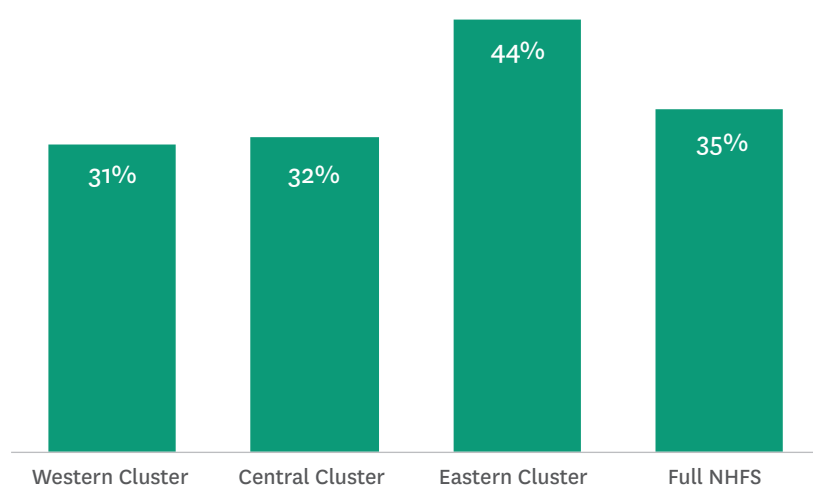
Overall, 35 percent of the HHs were severely negatively affected by increase in food prices. Eastern Cluster had the highest percentage of HHs (44 percent) that reported being negatively affected.

To cope with these food price shocks, HHs used a wide variety of forest products. The most frequently used are the same as those used to cope with food insecurity, in the same order of importance:

1. Bushmeat
2. Bush yam, and
3. Fish.

Figure 18 | Top Three Forest Products Used to Cope during Food Price Shocks in the Last 12 Months (% of HHs Affected by Price Increase)
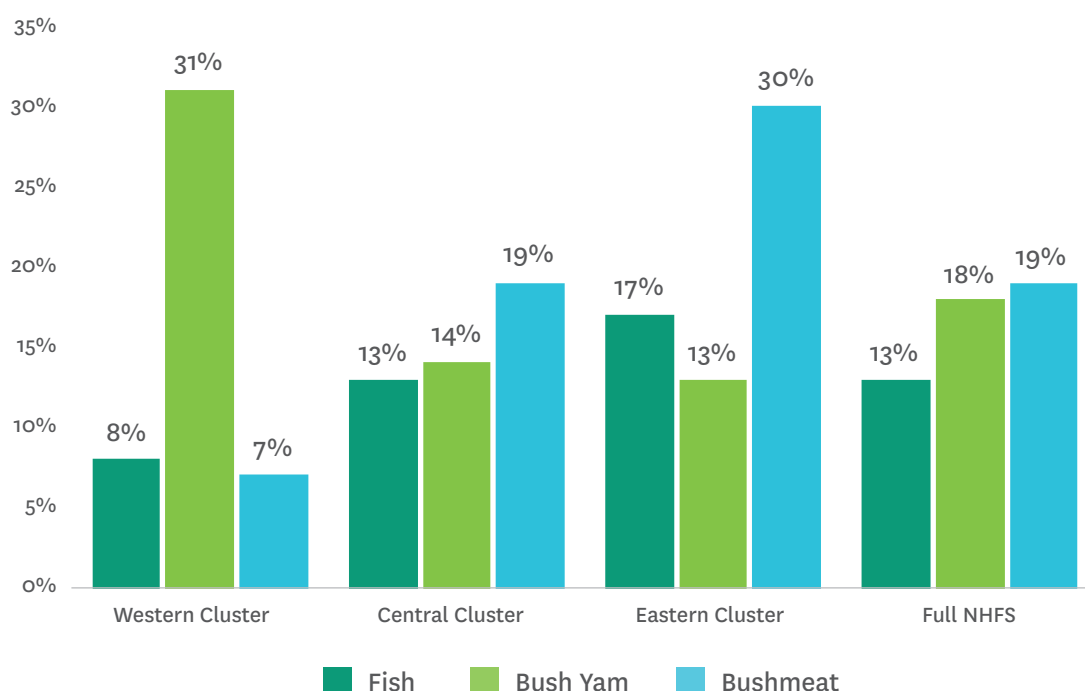
Bushmeat was relied on by 19 percent of HHs, bush yam by 18 percent, and fish by 13 percent. Other products commonly used to cope with food price shocks include snails, locusts, mushroom, bush pepper, and palm cabbage.

During periods of food price shock, most HHs relied heavily on these forest products for self-consumption, or both consumption and sale. As with periods of food insecurity, only a negligible number of HHs reported using these products solely for sale.

Overall, 67 percent of HHs who used bush yam to cope during times of food price shocks used it strictly as a source of food. An additional 31 percent of HHs used bush yam for both consumption and sale. Fish was used by 57 percent of HHs just for consumption versus 39 percent of HHs that used it for both purposes. Bushmeat was used by all three clusters slightly more for both consumption and sale with 44 percent of HHs using it just for consumption and 56 percent using it for both consumption and sale.

Figure 19

Using Forest Products for Consumption Only in the Last 12 Months (% of HHs using Product to Counter Price Shock)

Consumption Only

Western Cluster: Fish 44%, Bush Yam 72%, Bushmeat 45%
Central Cluster: Fish 52%, Bush Yam 51%, Bushmeat 52%
Eastern Cluster: Fish 66%, Bush Yam 80%, Bushmeat 37%
Full NHFS: Fish 57%, Bush Yam 67%, Bushmeat 44%

Legend: ■ Fish ■ Bush Yam ■ Bushmeat
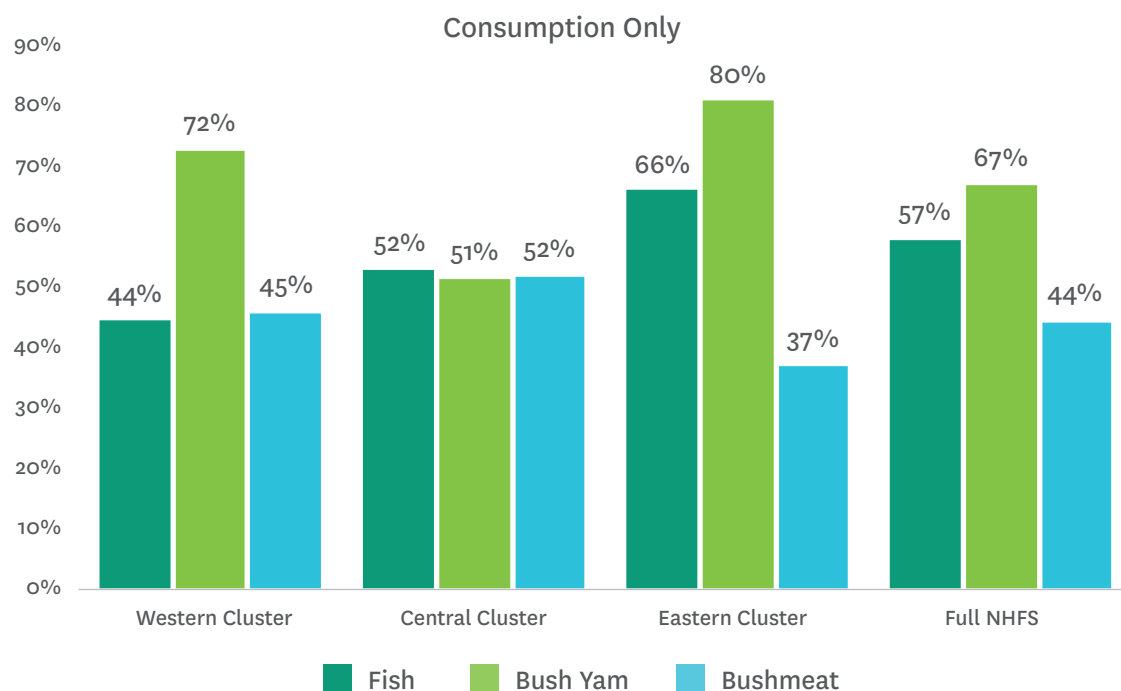
Figure 20

Using Forest Products for Consumption Only in the Last 12 Months (% of HHs using Product to Counter Price Shock)

Consumption and Sale

Western Cluster: Fish 56%, Bush Yam 28%, Bushmeat 55%
Central Cluster: Fish 43%, Bush Yam 43%, Bushmeat 48%
Eastern Cluster: Fish 31%, Bush Yam 20%, Bushmeat 63%
Full NHFS: Fish 39%, Bush Yam 31%, Bushmeat 56%

Legend: ■ Fish ■ Bush Yam ■ Bushmeat
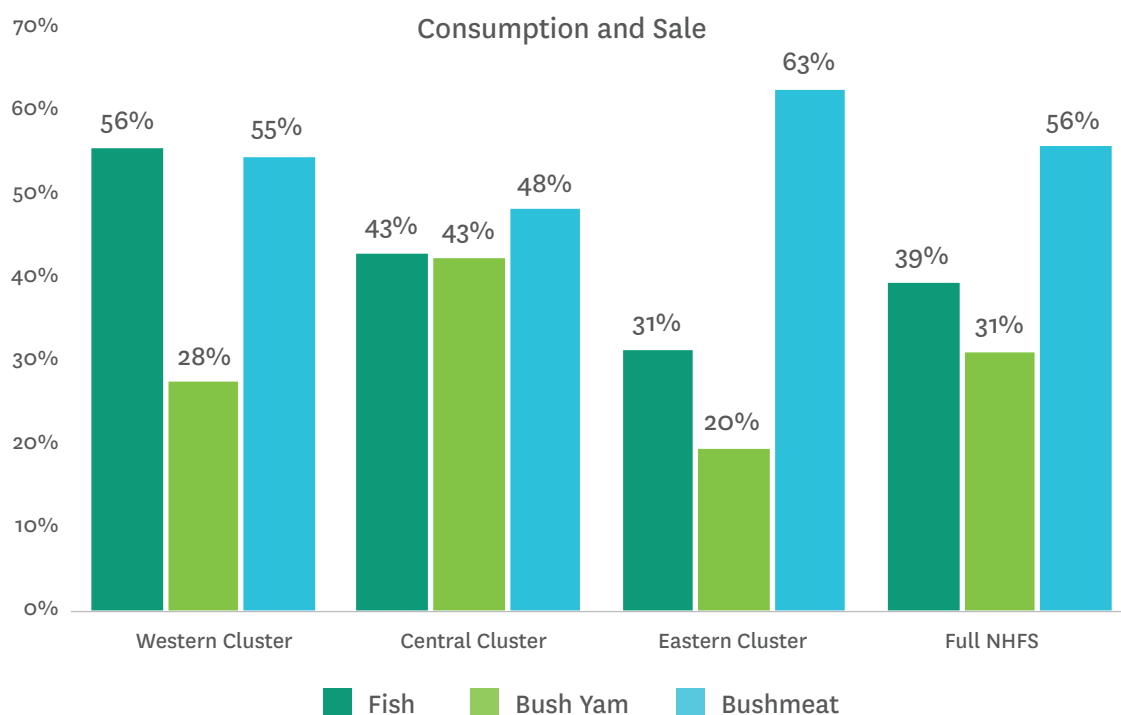
There were some differences between the clusters too. Eastern Cluster had the highest levels of consumption-only usage of these products and the lowest combined usage. Although, it had the highest reported combined usage of bushmeat at 63 percent. Central Cluster reported the highest incidence of sale-only use (though the incidence is very low).

Top Three Forest Products Used to Cope during Food Price Shocks in the Last 12 Months (% of HHs Affected by Price Increase)
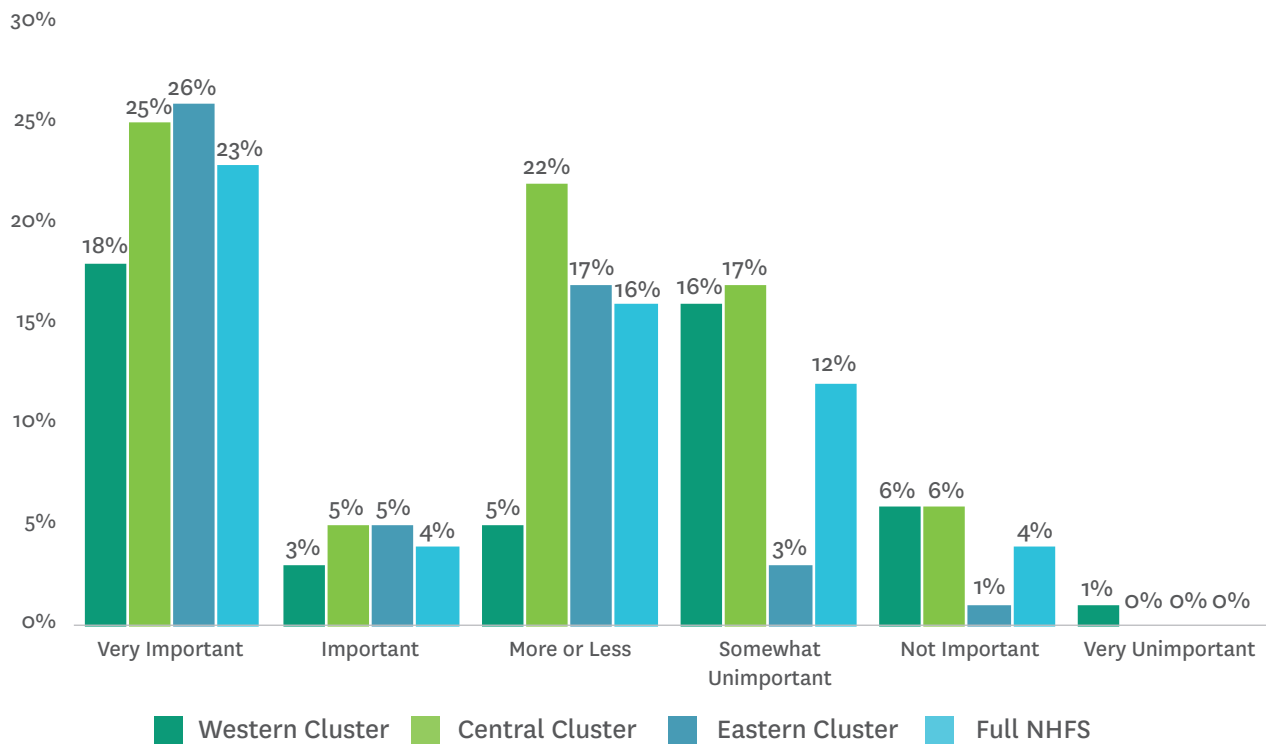
Overall, 43 percent of HHs affected by price increase confirmed that forest products were either 'very important', or 'more important' or 'more or less' important than other coping mechanisms to help them recover from food price shocks. Across all the clusters, 23 percent stated that food products were 'very important', four percent said they were 'important', and 16 percent described them as 'more or less' important.

Central and Eastern Clusters showed a slightly higher rating than Western Cluster. HHs in Western Cluster rated them at 18 percent for 'very important' whereas for Central Cluster it was 25 percent and Eastern Cluster it was 26 percent.

What Do the Data Tell Us?

During periods of food price shock, forest products become either a major source of HH food consumption or are used for consumption and sale to recover from the shock. Overall, out of those HHs that collected bushmeat, more than half of the HHs used it for self-consumption as well as for sale to recover from food price shock. Fish and bush yam were used by more HHs for self-consumption.

Hardly any HHs sourced these products solely to sell. However, a small number of HHs in Central Cluster collected fish and bush yam strictly for selling purposes.

4.2.2 MEETING HH NEEDS

4.2.2.1 Health

Key Results

- Of the HHs that sought medical assistance, more than **50 percent** used medicinal plants.
- **77 percent** of HHs that used medicinal plants collected them from the forest and communal lands.
- **22 percent** of HHs using medicinal plants reported a decline in the availability of medicinal plants over the last 5 years.
- **75 percent** of HHs using medicinal plants preferred modern medicine.

Key Insights

- Due to decreased availability of medicinal plants in forest, HHs spend more time collecting medicinal plants or cultivating medicinal plants themselves.
- Medicinal plants, largely collected from communal lands, provide a health resource to HHs, particularly important when the costs of modern medicines are high.

Survey Responses: Dependence on Medicinal Plants

Health is important for everyone, and the survey wanted to identify the role forests have in supporting the health needs of HHs. The survey asked HHs about their medical needs, the use of medicinal plants from the forest, and how they sourced medicinal plants during the last 12 months. The survey also asked if HHs had witnessed any change in the availability of medicinal plants in the last five years.

Figure 22 | Percentage of HHs who Sought Medical Assistance and who also Used Medicinal Plants in the Last 12 Months

Sought Medical Assistance

Used Medicinal Plants
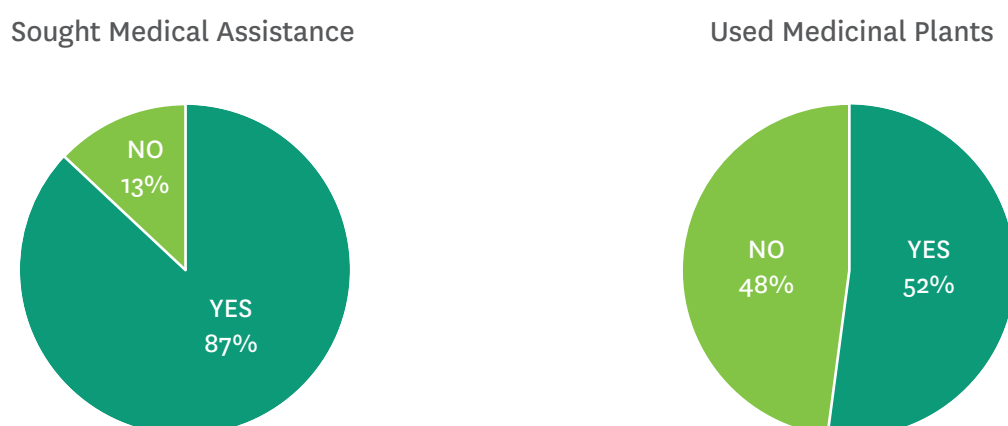
Overall, 87 percent of sought some sort of medical assistance during the previous 12 months. Of those, 52 percent confirmed having used medicinal plants.

Figure 23 | Where did the HHs who Used Medicinal Plants Source Them from in the Last 12 Months?(% of HHs using Medicinal Plants)

The most common source of medicinal plants was collection reported by an average of 77 percent of HHs. Sourcing medicinal plants from a traditional healer was reported by an average of 19 percent of HHs and an even smaller amount reported having purchased them (four percent).

Slightly fewer HHs from Central Cluster collected medicinal plants (73 percent) compared with both Western Cluster (81 percent) and Eastern Cluster (82 percent). In addition, a higher percentage of HHs from Central Cluster sourced medicinal plants from traditional healers (23 percent) than Western and Eastern Cluster (14 percent each).

Most HHs collected medicinal plants from communal lands. About 91 percent of HHs accessed communal lands, while seven percent of the HHs accessed private lands for collecting medicinal plants. Only two percent of the HHs accessed state-owned land for this purpose.

Figure 24 Legal Status of Land Where HHs Collect Medicinal Plants in the Last 12 Months (% of HHs Collecting Medicinal Plants)
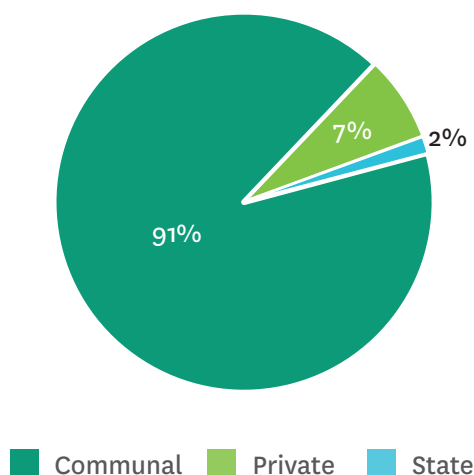
Figure 25 Availability of Medicinal Plants over the Last Five years (% of HHs Using Medicinal Plants)

91%   7%   2%

Communal   Private   State

22%   15%   63%

No Change   Increased   Decreased
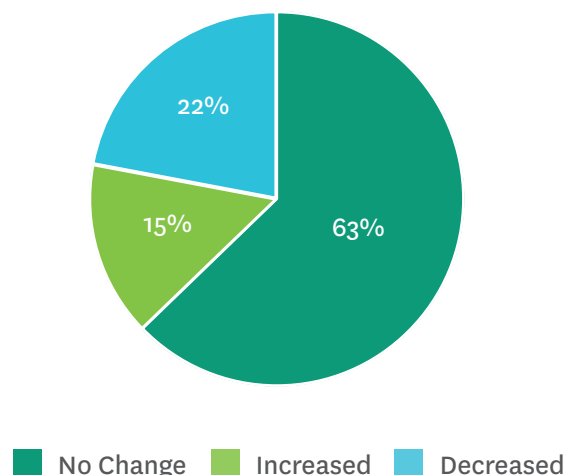
The NHFS explored whether access to medicinal plants was changing. Sixty three percent of HHs using medicinal plants reported no change in availability while 37 percent reported change in availability. A small number (15 percent) reported an increase in availability and 22 percent stated that availability had decreased over the past five years.

Figure 26 Response to Decline in Availability of Medicinal Plants over the Past Five years (% of HHs Reporting Decreased Availability)

Western Cluster   Central Cluster   Eastern Cluster   Full NHFS
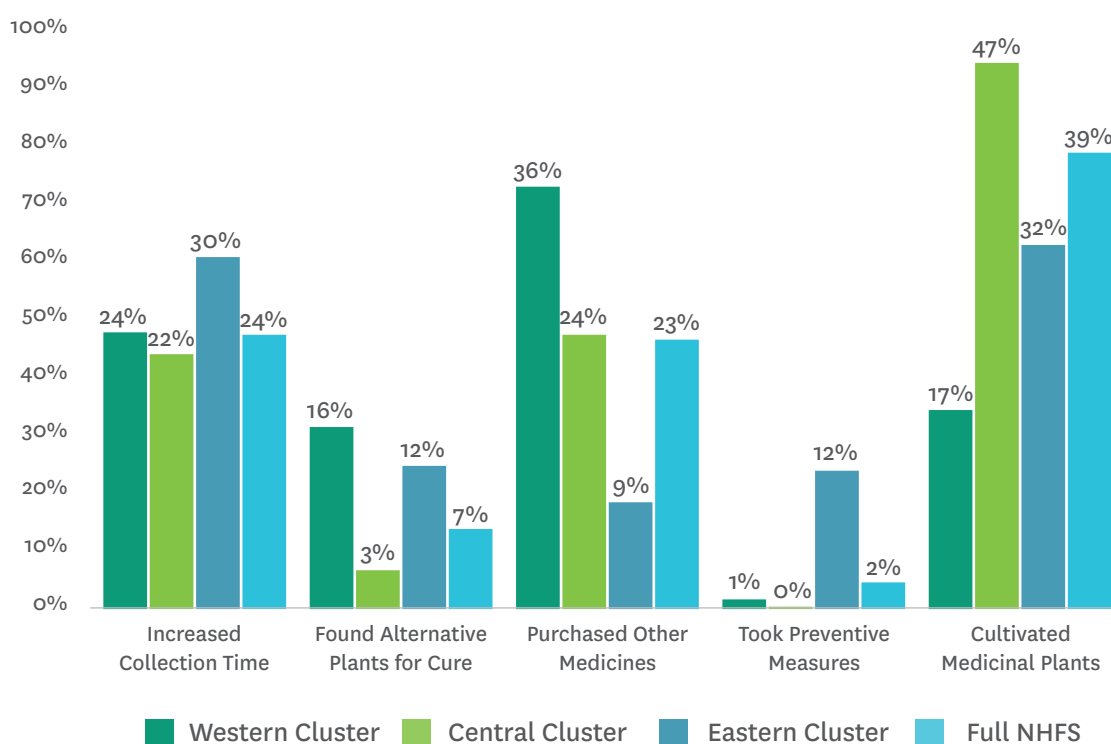
The survey also asked HHs what they did to address the decline in the availability of medicinal plants in the forest. Many HHs (39 percent) that reported a decline over the past five years responded by cultivating medicinal plants while others allocated more time to collect the plants (24 percent). Some (23 percent) purchased other medicines instead. The lowest responses to a decline in availability was finding alternative plants for cures (seven percent) and taking preventive measures to avoid getting sick (two percent).

Central Cluster reported cultivating medicinal plants more than the other clusters. In Central Cluster, 47 percent reported cultivating plants, compared to Eastern Cluster at 32 percent and Western Cluster at only 17 percent. Western Cluster reported a higher level of purchasing other medicines (36 percent) compared to Eastern Cluster where only nine percent of HHs reported purchasing other medicines.

HHs that used medicinal plants were also asked about their preferred types of medicine. Overall, 75 percent of HHs said they would prefer to use modern medicine. Only 17 percent preferred to use traditional medicine.

Figure 27 | Medical Preference of HHs Using Medicinal Plants in the Last 12 Months (% of HHs Using Medicinal Plants)

Legend: Any preference · Traditional · Modern
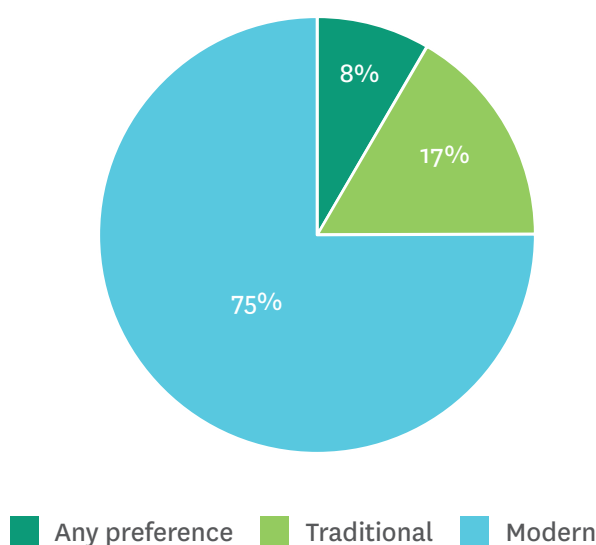
What Do the Data Tell us?

A majority of HHs using medicinal plants reported seeing no change in the availability of medicinal plants over the past five years. However, they also reported on their strategies to deal with a lack of availability of medicinal plants.

Despite an overwhelming preference for modern medicine, only 22 percent of HHs that reported a decline in the availability of plants over the past five years actually responded by purchasing modern medicines. In fact, 24 percent of HHs opted to continue using medicinal plants by spending more time collecting them or cultivating them. Others reported seeking out alternative plants that may be more available.

The lack of a shift to modern medicine in the face of declining availability of medicinal plants may indicate that modern medicines are unaffordable or unavailable. This could increase the collection of medicinal plants, as they provide an affordable and locally available alternative.

However, HHs also reported a strong preference for modern medicine. This is a trend worth noting. As modern medicine becomes more available, people may begin to use medicinal plants from forests less often.

4.2.2.2 Woodfuel for HH energy needs

Key Results

- **95 percent** of HHs rely on fuelwood to meet their various energy needs, only **two percent** of which purchase fuelwood.
- **21 percent** of HHs rely on charcoal to meet their various energy needs, **54 percent** of which purchase charcoal.
- **95 percent** of all HHs used fuelwood for cooking, while **20 percent** of HHs used charcoal for cooking.

Key Insights

- Forest-proximate HHs are heavily reliant on woodfuel, including fuelwood and charcoal for their energy needs.
- Almost all HHs rely on fuelwood to meet their various energy needs and almost all HHs collect their own fuelwood.
- Overall, majority of the consumed charcoal is purchased whereas fuelwood is almost exclusively collected by the HHs themselves.

Survey Response: Using Woodfuel for Cooking

Forests play an important role in meeting rural energy needs. The NHFS asked HHs about their use of charcoal and fuelwood for various HH energy needs-cooking, water sterilization, heating and lighting. The focus of this section is on HH cooking needs and how they sourced fuelwood and charcoal, in the last 12 months, to meet these needs.

Figure 28 | Energy Needs - Percentage of HHs who Used Charcoal and Fuelwood for Cooking by Cluster in the Last 12 months
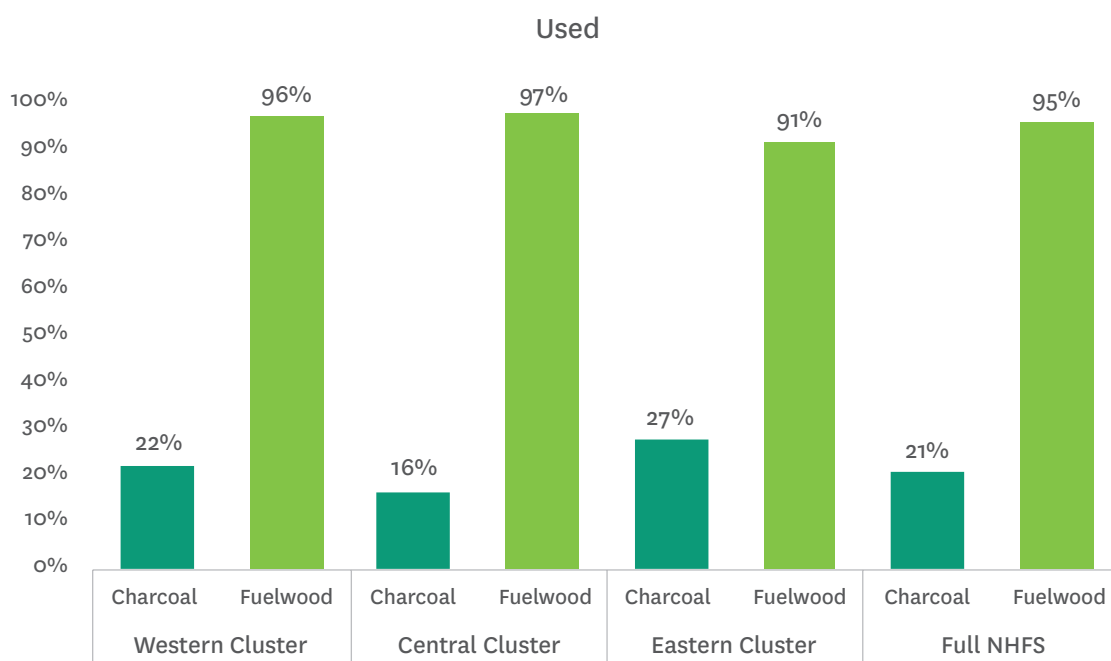
Used

All three clusters mainly used fuelwood for to cook with, and a lot less of them used charcoal. Overall, 95 percent of HHs reported that they used fuelwood, compared to only 21 percent of HHs reporting they had used charcoal.

Figure 29 | Energy Needs - Percentage of HHs Using Charcoal and Fuelwood who Purchased Them in the Last 12 Months
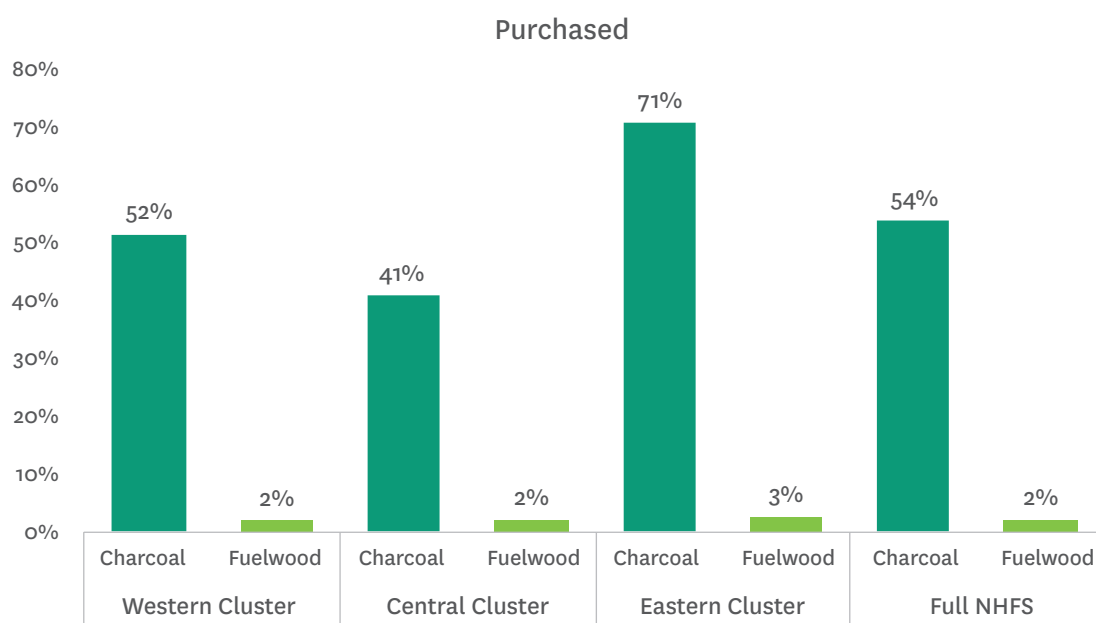
Purchased

Only two percent of HHs bought fuelwood while 54 percent of HHs bought charcoal. In addition, some clusters purchased charcoal more than others. In Eastern Cluster, 71 percent of HHs reported purchasing charcoal while in the Central Cluster, only 41 percent purchased charcoal.

Figure 30 | Cooking - Percentage of HHs Who Used Charcoal and Fuelwood for Cooking in the Last 12 Months
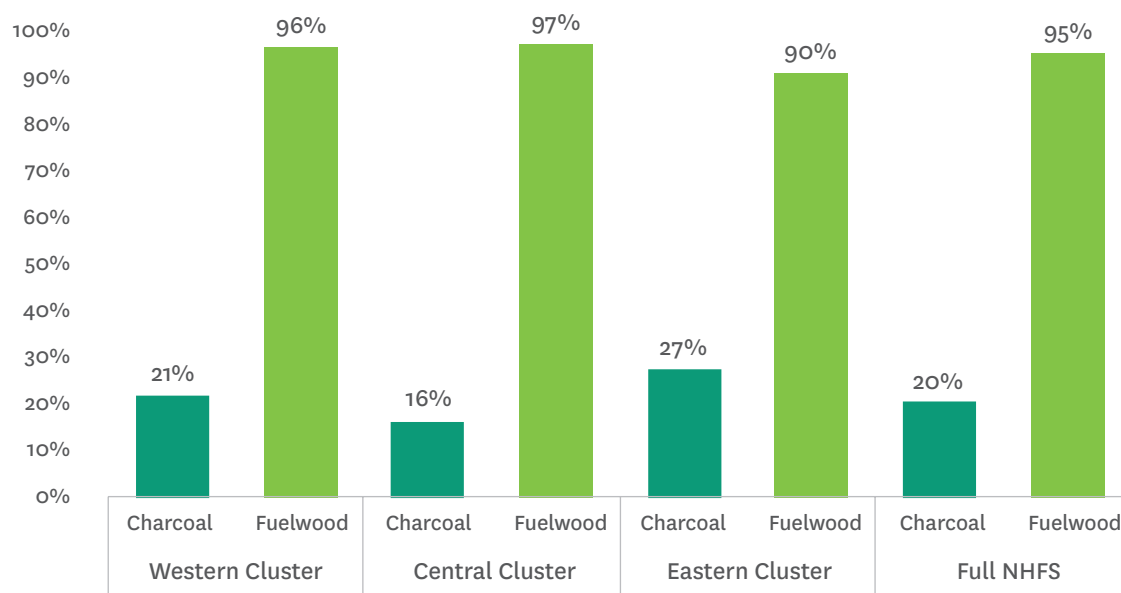
When asked about the use of charcoal and fuelwood for cooking purposes, HHs confirmed that the majority (95 percent) used fuelwood rather than charcoal. Eastern Cluster used slightly more charcoal at 27 percent and Central Cluster used the least amount of charcoal at 16 percent.

What Do the Data Tell Us?

Almost all HHs (95 percent) rely on fuelwood to meet their various energy needs and approximately 20 percent of HHs use charcoal. In addition, while fuelwood is mostly collected with very little being bought (only two percent), charcoal is more frequently purchased, especially in Eastern Cluster.

The use of fuelwood and charcoal for cooking purposes showed a similar pattern – HHs mostly used fuelwood for cooking (95 percent) with a minority using charcoal (20 percent). The only slight variation was in Eastern Cluster which showed a marginally higher rate of use of charcoal (27 percent) for cooking and lower rate of fuelwood (90 percent).

4.2.2.3 Construction

Key Results

- **36 percent** of HHs reported using forest products for dwelling construction or maintenance in the last 12 months.
- Of the HHs using forest products for dwelling construction, **59 percent** reported they 'always' relied on forest products for construction or maintenance material.
- The top three forest products used for construction purposes were, in order of importance:
  1. **Poles**
  2. **Fronds**
  3. **Timber**

Key Insights

HHs in the cluster the highest poverty rate and forest cover had a higher dependence on forest products for construction or maintenance of their dwelling.

Survey Responses: Forest Products used for Construction

Forest products are often used for construction purposes. The survey asked HHs whether they used any forest products for construction or maintenance of their dwellings, how dependent they were on these forest products for construction materials, and what the top three forest products were that they used for construction purposes in the last 12 months. Commonly used forest products for construction purposes included timber harvested from local forests, poles, vines, thatch, and fronds.

Figure 31 | Percentage of HHs who Used Forest Products for Construction in the Last 12 Months
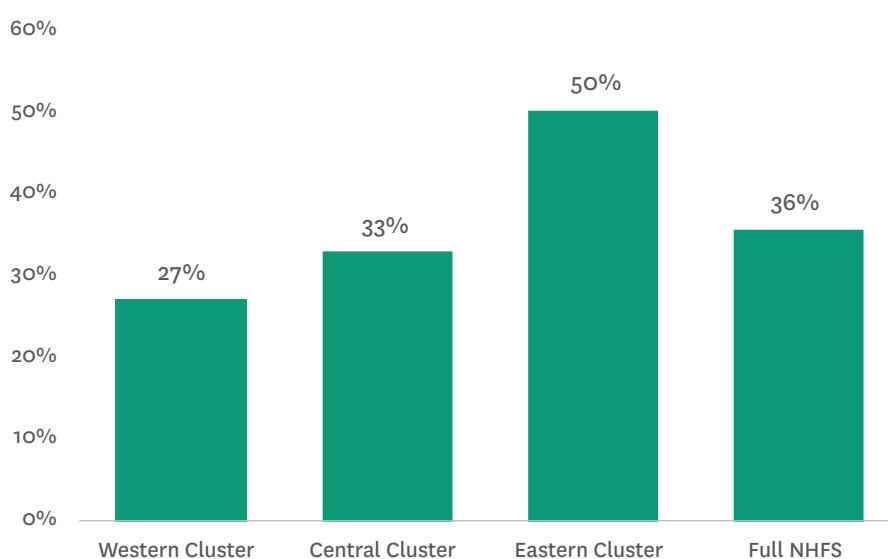
The majority of HHs reported not using forest products for construction. Only 36 percent of HHs reported using forest products for construction purposes during the past 12 months. Western Cluster used forest products the least with only 27 percent using them. Eastern Cluster used them the most with 50 percent of HHs reporting having used them.

Out of the 36 percent of HHs who used forest products for construction, the majority of them sourced these products from communal land. Ninety three percent of products used for construction purposes were sourced from communal land. Only six percent of HHs obtained construction materials from private land and just one percent of HHs from state land.

Figure 32	Legal Status of the Land used to Source Construction Materials in Last 12 Months (% of HHs Using Forest Products for Construction)	Figure 33	HHs Dependent on Using Forest Products for Construction in the Last 12 months (% of HHs Using Forest Products for Construction)
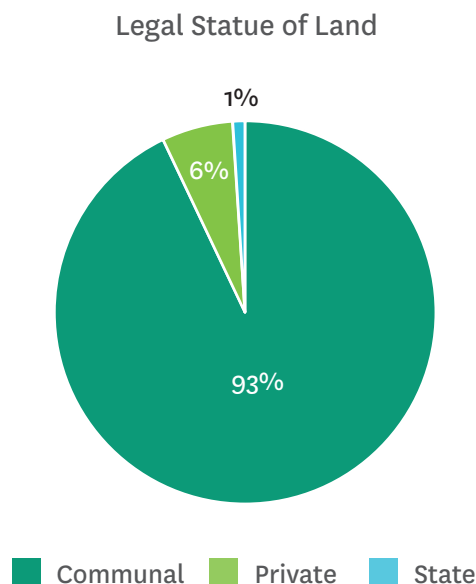
Legal Statue of Land

Dependent on Forest Products for Construction
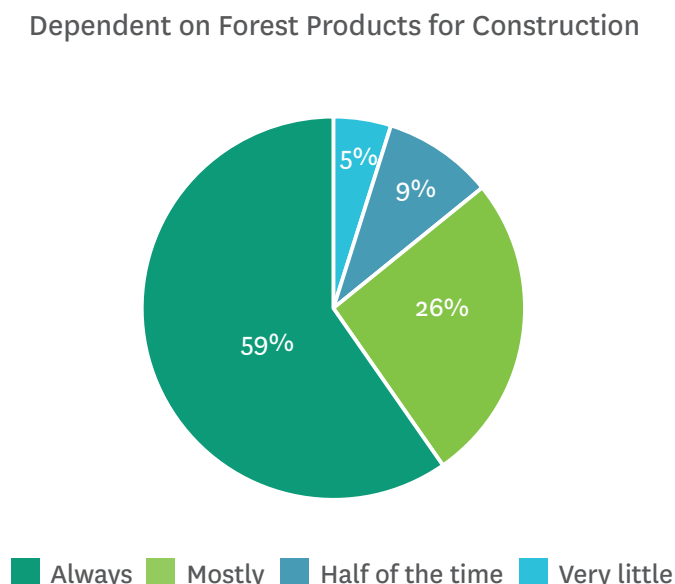
Of HHs using forest products for dwelling construction and maintenance, 85 percent relied heavily on forest products. Fifty-nine percent of HHs reported they 'always' used forest products, while 26 percent 'mostly' used forest products for construction. Nine percent of HHs reported they relied on forest products and alternatives equally, for construction and five percent reported relying 'very little' on forest products for the same.

The top three forest products used for construction purposes were, in order of importance:
1. Poles
2. Fronds, and
3. Timber.

Figure 34

Use of Top Three Forest Products by HHs Using them for Construction in the Last 12 Months (% of HHs using Forest Products for Construction)
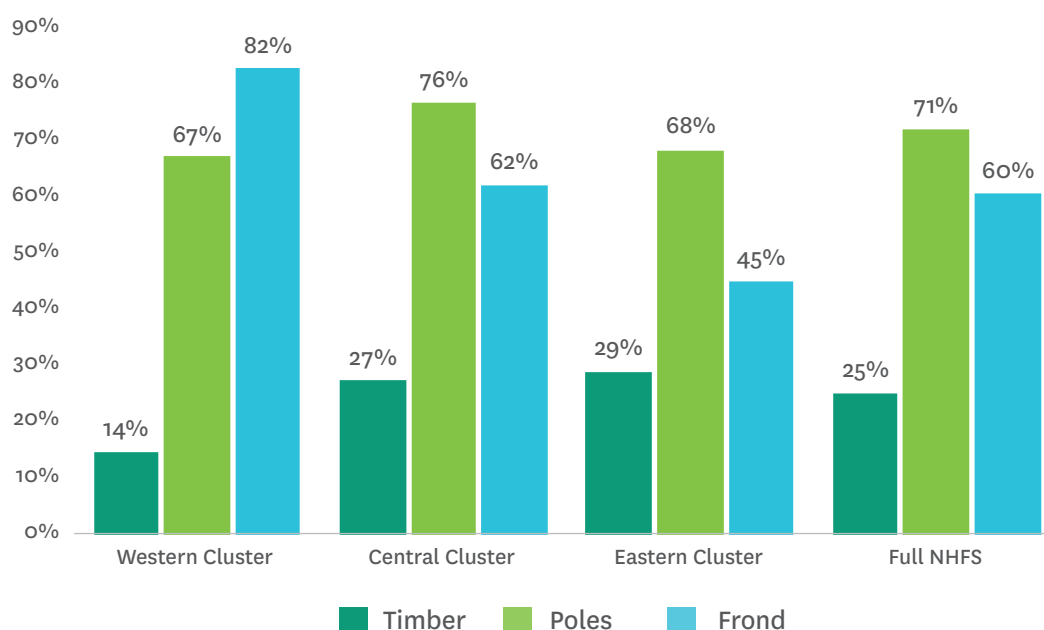
Overall, HHs used more poles (71 percent) than frond (60 percent) and timber (25 percent). Central cluster used poles more than the other clusters (76 percent) compared to 67 percent for Western cluster and 68 percent for the Eastern cluster. Western cluster used frond significantly more than the other clusters (82 percent compared to 62 percent for Central cluster and 45 percent for Eastern cluster).

HHs also found it easy to access land to collect forest products for construction materials. It was described by 84 percent of HHs as being 'very easy' to access. Only three percent described it as 'somewhat difficult'.

What Do the Data Tell Us?

Over one-third of HHs stated they used forest products for construction. Out of these HHs, the majority (59 percent) reported they reported they 'always' used forest products, while 26 percent 'mostly' used forest products for construction. HHs in clusters with a higher proportion of high-density forest appeared to be more reliant on these forest products. Eastern Cluster had the highest forest density and 50 percent of HHs used forest products for construction purposes. This compared with only 21 percent in Western Cluster and 33 percent in Central Cluster.

HHs also confirmed that access to land was not an issue. The vast majority (84 percent) reported that it was 'very easy' to access land to collect forest products for construction purposes.

4.2.3 GENERATING HH INCOME

4.2.3.1 Collecting Forest Products for Consumption or Income

Key Results

- **70 percent** of HHs collect forest products for consumption or income generation.
- The top five products collected are:
  1. Fuelwood
  2. Poles
  3. Bushmeat
  4. Rattan
  5. Fronds
- The collection of fuelwood involved more HH members (2.05) whereas the collection of bushmeat involved less HH members (1.34).
- More time was spent collecting bushmeat (47 minutes per day) with only 34 minutes spent collecting fuelwood.
- Eastern Cluster had the highest percentage of HHs collecting forest products **(79 percent)**.

Key Insights

- The majority of HHs collected a variety of forest products, either for their own use or sale. Over **40 different forest products** were reportedly collected by HHs.
- HHs invest a significant amount of time and labor in collecting these forest products.
- The incidence of forest products collected may be dependent on many factors, including poverty rates, forest density, accessibility of forests, accessibility to products from alternative sources, and market access, among others.

Survey Responses: Collection of Forest Products

This part of the survey explored whether HHs collected any forest products in the last 12 months for their own use or sale. It identified what forest products were collected, how much time HH members spent collecting them, the quantity collected, and the use of the products.

Figure 35 **Percentage of HHs Who Collected Forest Products in the Last 12 Months**

Collecting Forest Products
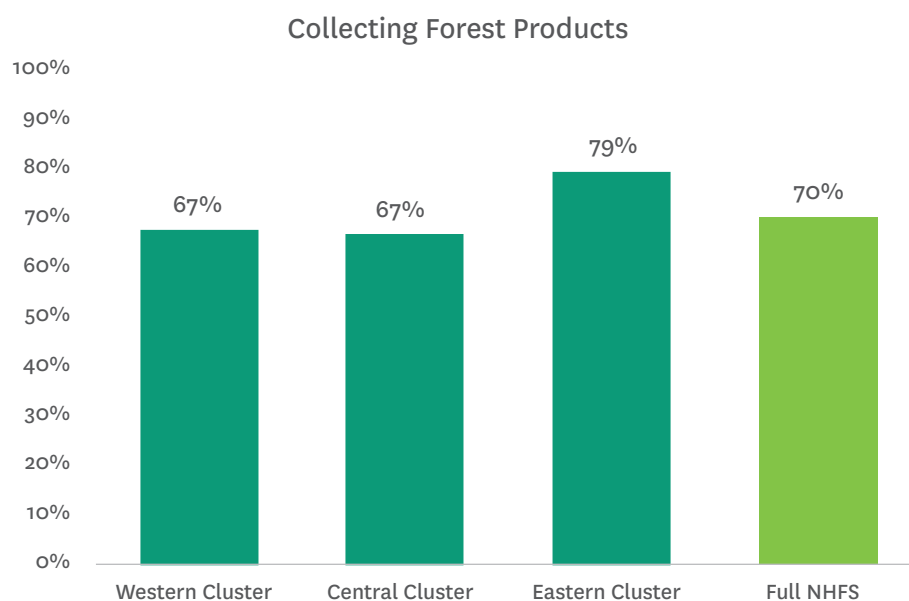
The majority of HHs (70 percent) reported they had collected forest products for income purposes during the last 12 months. HHs in the Eastern Cluster reported the highest collection rate at 79 percent. This may be a response to a number of factors such as demand from and access to markets and more urban centers.

Figure 36 **Top Five Forest Products Collected for Income in the Last 12 Months (% of all HHs)**
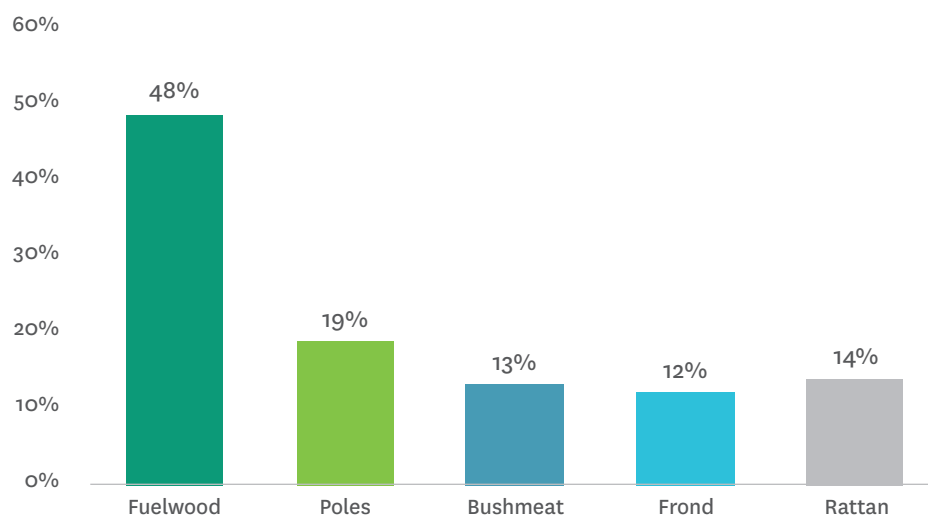
HHs also reported on the type of products they collected from the forests for income purposes. Fuelwood was the product collected by the most HHs (48 percent of all HHs). The other main products were poles (19 percent), bushmeat (13 percent), fronds (12 percent) and rattan (14 percent).

Figure 37

Percentage of HHs Across Clusters Who Collected Top Five Forest Products in the Last 12 Months (% of all HHs)

Top Products by Cluster

Western Cluster **Central Cluster** **Eastern Cluster**
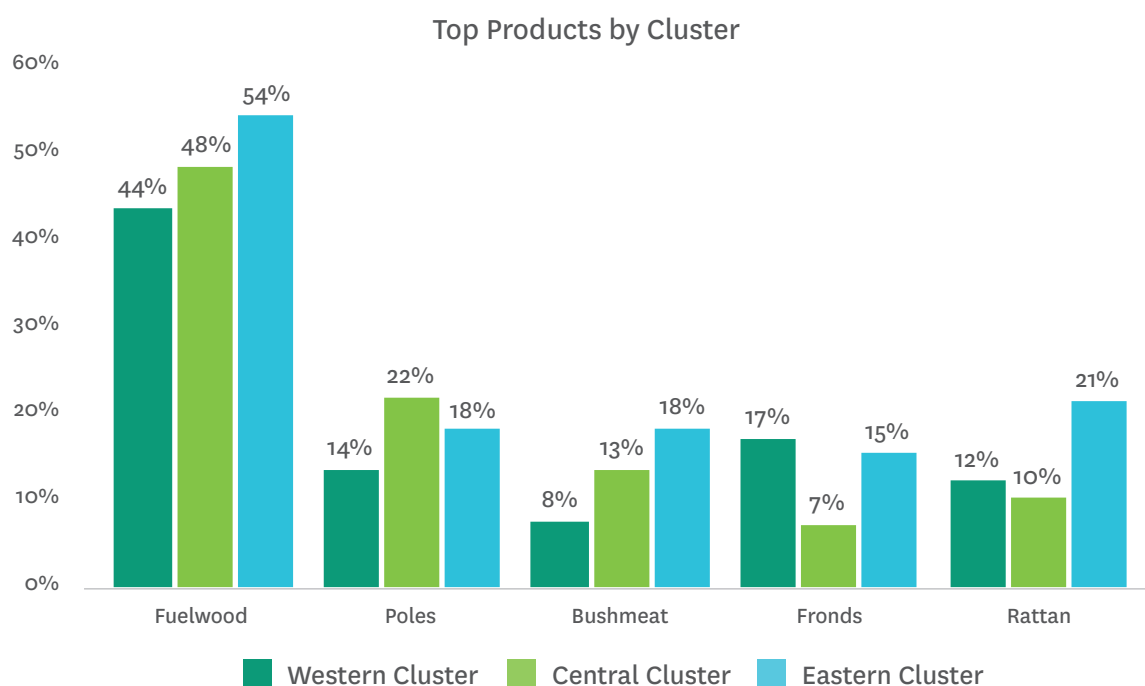
However, different clusters collected different products at different rates. A higher percentage of all HHs in Eastern Cluster collected fuelwood (54 percent), bushmeat (18 percent), and rattan (21 percent) compared to the other two clusters. Whereas, Central Cluster had a higher percentage of HHs collecting poles (22 percent).

Figure 38 | **Average Number of HH Members Collecting Top Five Forest Products in the Last 12 Months**
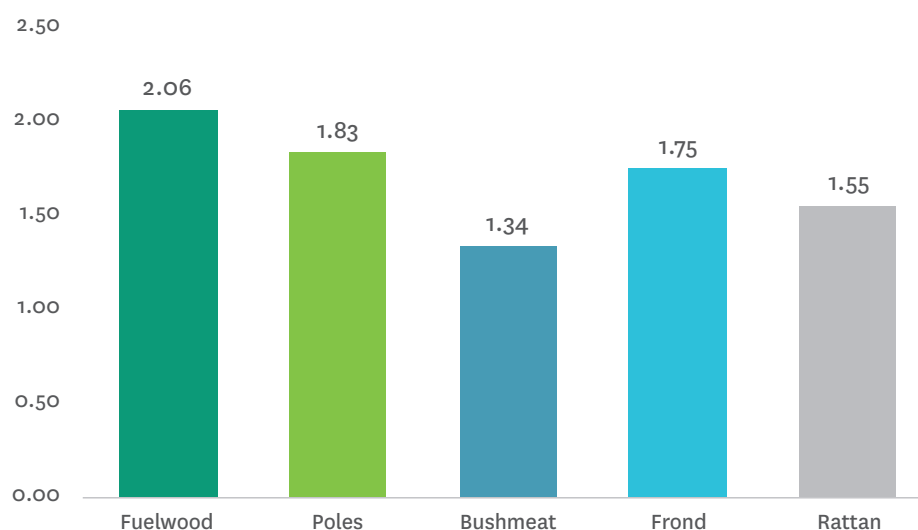
Fuelwood was collected by the highest number of HH members and bushmeat by the lowest.
The average number of HH members was 4.1. On average, 2.06 HH members were engaged in collecting fuelwood, 1.83 in collecting poles, 1.75 in collecting fronds, 1.55 in collecting rattan and 1.34 in collecting bushmeat.

Minutes per Day

Note: These figures represent the average number of minutes per day in the course of the year spent by the HH member that is primarily responsible for the collection of each product. This takes into consideration the estimated number of weeks worked, number of days per week worked, and number of hours per day worked.

These HH members also spent many hours collecting forest products. The HH members that primarily collected bushmeat spent an average of 47 minutes per day, every day. Slightly less time was spent collecting fuelwood (34 mins on average). Time spent collecting poles was 13 minutes, rattan was 12 minutes, and fronds was 10 minutes.

What Do the Data Tell Us?

Majority of HHs collect a variety of forest products, either for their own use or sale. Over 40 different types of forest and wild products were reportedly collected by HHs. Fuelwood was collected by the most HHs, likely to meet their various energy needs. In addition to fuelwood, the most commonly collected products were poles, rattan, and bushmeat, which are important forest products to fulfill HHs basic needs such as construction and food.

HHs invest a significant amount of time and labor in collecting these forest products during the year. On average, HHs spent an hour and ten minutes collecting fuelwood, over an hour collecting bushmeat and another hour collecting fronds, poles, and rattan, per day, every day. This may reflect the low opportunity cost of their labor which makes HHs willing to put in a lot of time searching and collecting these products for self-consumption and income generation.

Based on cluster-level data, the incidence of forest product collection is higher in areas with more dense forests. Eastern Cluster, for example, had the highest rate of product collection as well as the densest forests.

4.2.3.2 Processing of Forest Products

Key Results

- **24 percent** of HHs processed forest products.
- Central Cluster had the highest percentage of HH processing forest products **(29 percent).**

Key Insights

HHs collected forest products much more frequently for consumption than for processing.

Survey Responses: Processing of Forest Products

HHs were also asked whether they processed any forest products in the past 12 months for either consumption or generating income.

Figure 40 | Percentage of HHs Collecting and Processing Forest Products in the Last 12 Months
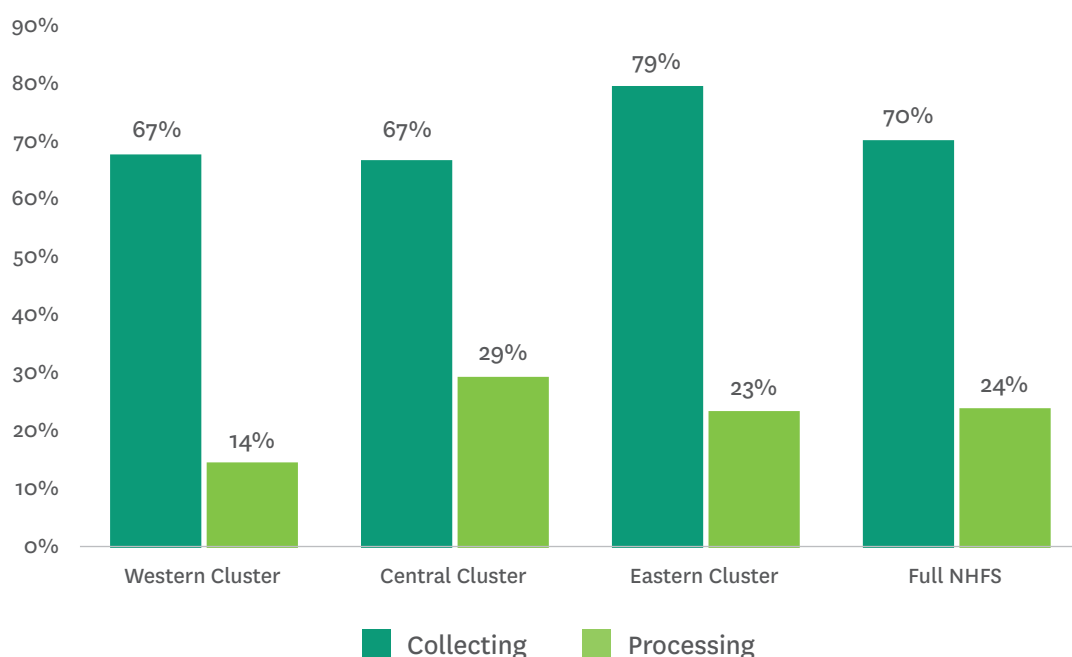
More HHs reported collecting forestry products in the last 12 months than those processing forestry products. On average, 70 percent of HH collected any forest products and only 24 percent processed forest products. This pattern of high incidence of forest product collection and low incidence of processing of forest product is reflected in all three clusters.

Central Cluster had more HHs than the others who processed forest products (29 percent). Only 14 percent of HHs in Western Cluster reported processing forest products and Eastern Cluster had 24 percent of HHs.

What Do the Data Tell Us?

Although the majority of HHs collect forest products for consumption or sale, only 24 percent of HHs reported processing any forest products. One explanation may be that poverty forces people into consuming raw, unprocessed products rather than processing them. The limited incidence of processing may also be because of a lack of skills or equipment or facilities, for processing, or a limited demand for processed forestry products or thin or inaccessible markets.

4.2.4 PROVIDING INDIRECT BENEFITS

4.2.4.1 Valuable Socio-Economic Services

Key Results

- **98 percent** of HHs stated they had benefited from the valuable services provided by the forests around them.
- **73 percent** of HHs reported freshwater as a key forest benefit.

Key Insights

Nearly all HHs recognized the multi-faceted, non-monetary benefits provided by the forests around them.

Survey Responses: Types of Non-Monetary Forest Benefits

HHs were asked their perception of (non-monetary) benefits from forests in the last 12 months, and what those benefits were. The services and features from the forests included, in the order of importance, freshwater conservation, natural windbreak, shade, religious and cultural values, livestock grazing, erosion control, services to agriculture, climate regulation, recreation, aesthetic values, and education.

The majority of HHs recognized the importance of forests (98 percent) with the most commonly perceived forest benefit (73 percent of HHs) being a clean and reliable source of water (freshwater). Natural windbreak and shade were reported by nearly 50 percent of HHs as a benefit. Many HHs also reported religious and cultural value as a forest benefit (27 percent of HHs). Livestock grazing and erosion control were seen as forest benefits by about 21 and 20 percent of HHs respectively and services to agriculture were reported by 18 percent of HHs. Climate regulation, recreation, education and aesthetic values were also reported but only by a relatively small percentage of HHs.

Figure 41

Perceived Non-Monetary Benefits from Forests in the Last 12 Months (% of Full NHFS)
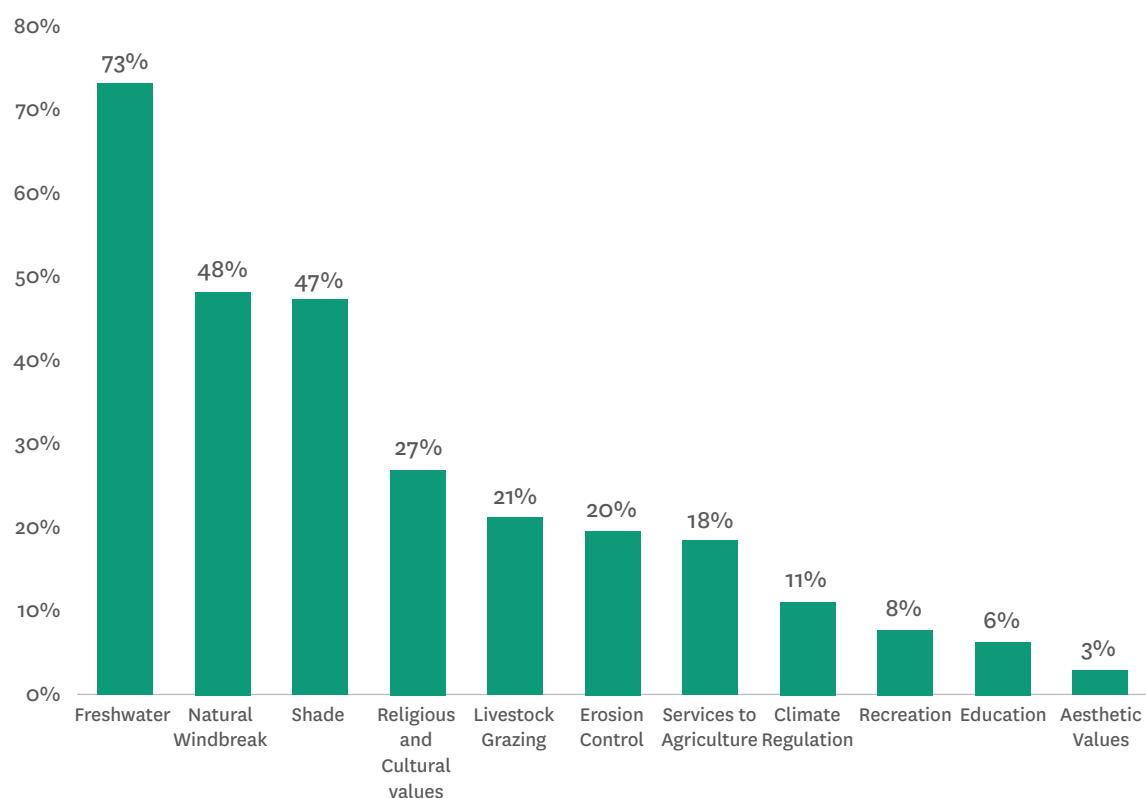
Figure 42

Perceived Non-Monetary Benefits from Forests in the Last 12 Months (% of Full NHFS by Cluster)

Western Cluster   Central Cluster   Eastern Cluster
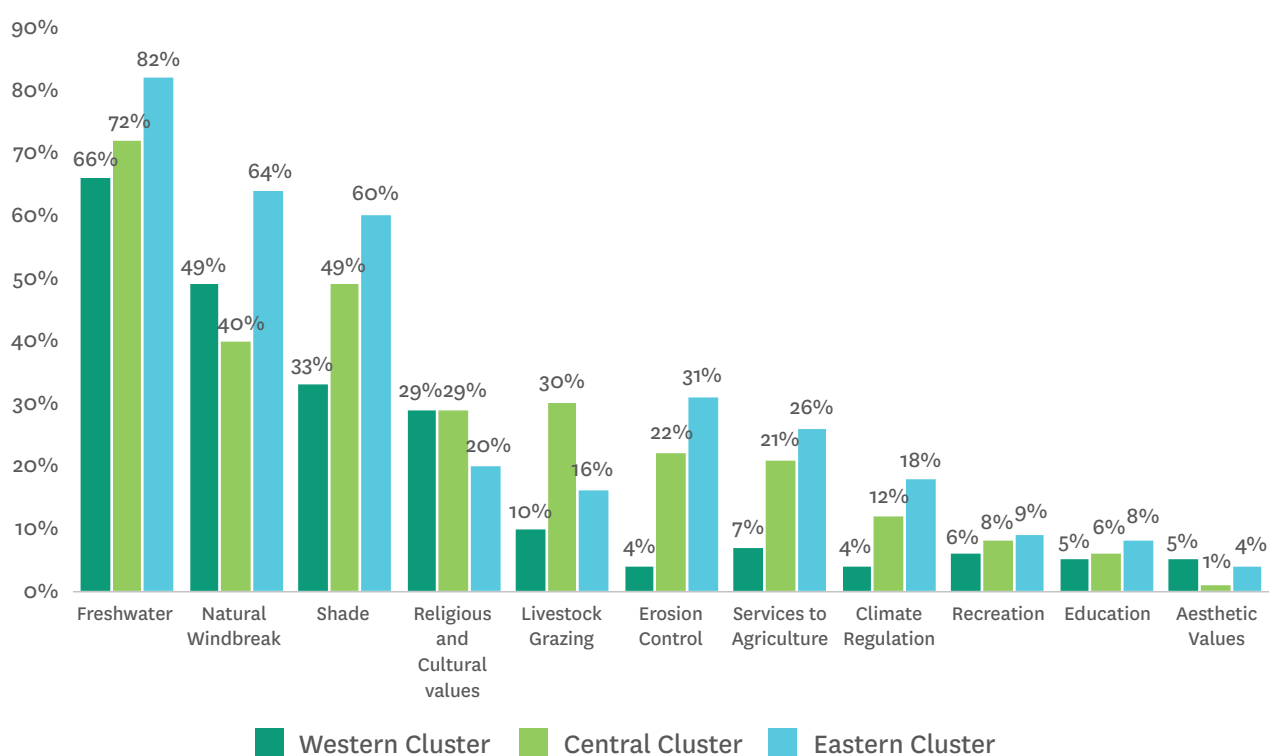
Based on cluster-specific data, overall HHs in Eastern Cluster appeared to recognize these benefits more than the other clusters. In Eastern Cluster, 82 percent of HHs reported freshwater as a benefit compared to only 66 percent in Western Cluster. Natural windbreak was reported by 64 percent of HHs in Eastern Cluster compared to only 40 percent in Central Cluster. Shade was reported by 60 percent of HHs in Eastern Cluster compared to 33 percent in Western Cluster. This trend followed through with every reported benefit except religious and cultural values, and livestock grazing. Western and Central Clusters recognized religious and cultural values more than Eastern Cluster (29 percent compared to 20 percent). In addition, 30 percent of HHs in Central Cluster reported livestock grazing as a benefit whereas in Eastern Cluster this only 10 percent.

What Do the Data Tell Us?

Most HHs recognize the valuable non-monetary services provided by forests around them, though the types of benefits reported by HHs varies. Broadly speaking, a higher percentage of HHs in Eastern Cluster recognized the importance of various non-monetary forest services as compared to other two clusters.

The benefits of forests as they relate to climate regulation are not widely recognized. Rather, the more immediate benefits such as those related to freshwater, shade, and natural windbreak were most frequently reported by HHs.

4.2.4.2 Payments for Environmental Services (PES)

Key Results

- Less than **one percent** of HHs received PES in the last 12 months.
- Over **88 percent** of HHs had no formal contract to receive PES.

Key Insights

- Very few HHs have benefitted from PES or similar approaches in the last 12 months.
- This suggests that there is room for PES and similar programs to increase awareness, economic opportunity, and forest conservation.

Survey Responses: Payment for Environmental Services (PES)

The survey explored the incidence of PES, including the incidence of formal contracts for PES, in the last 12 months. These PES were formal forest-related payments including payments for sustainable uses, grazing management, and access permits.

Figure 43

Percentage of HHs who Reported Receiving PES in the Last 12 Months

0.96%

99.04%

YES   NO

Received PES

10.0%
9.0%
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0%

0.2%   Western Cluster

1.3%   Central Cluster
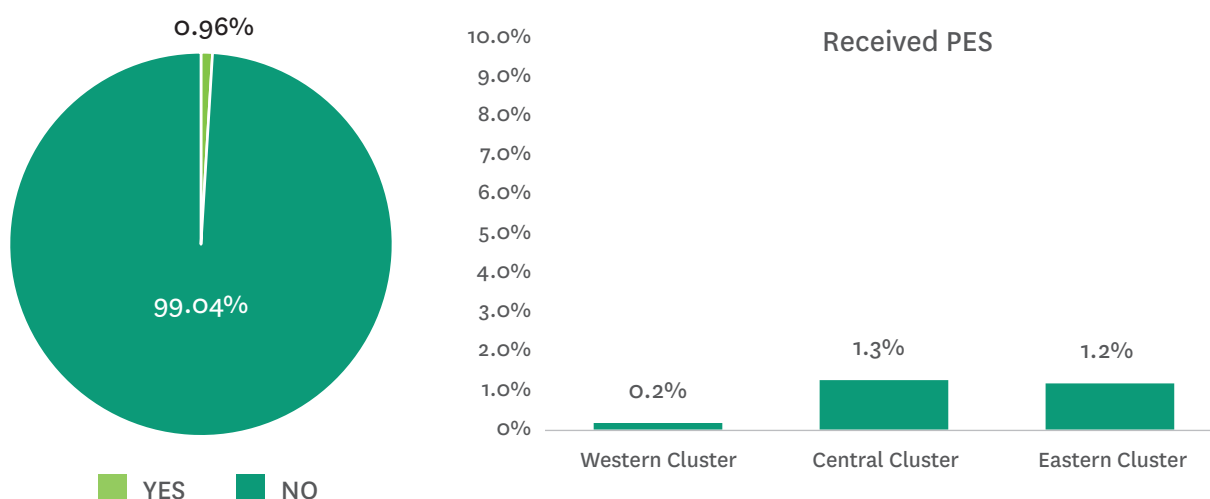
1.2%   Eastern Cluster

PES was almost non-existent across all the clusters with just less than one percent of HHs overall reporting having received a PES. Western Cluster was even less with only 0.2 percent of HHs reporting having received PES. In the full NHFS sample, only 16 HHs reported receiving PES payment (only three of which reported having a formal contract).

Figure 44   **Percentage of HHs Receiving PES with a Formal Contract in the Last 12 Months**

Formal Contracts

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%

	Western Cluster	Central Cluster	Eastern Cluster	Full NHFS
YES	0.0%	14.8%	6.9%	11.6%
NO	100%	85%	93%	88%

YES   NO
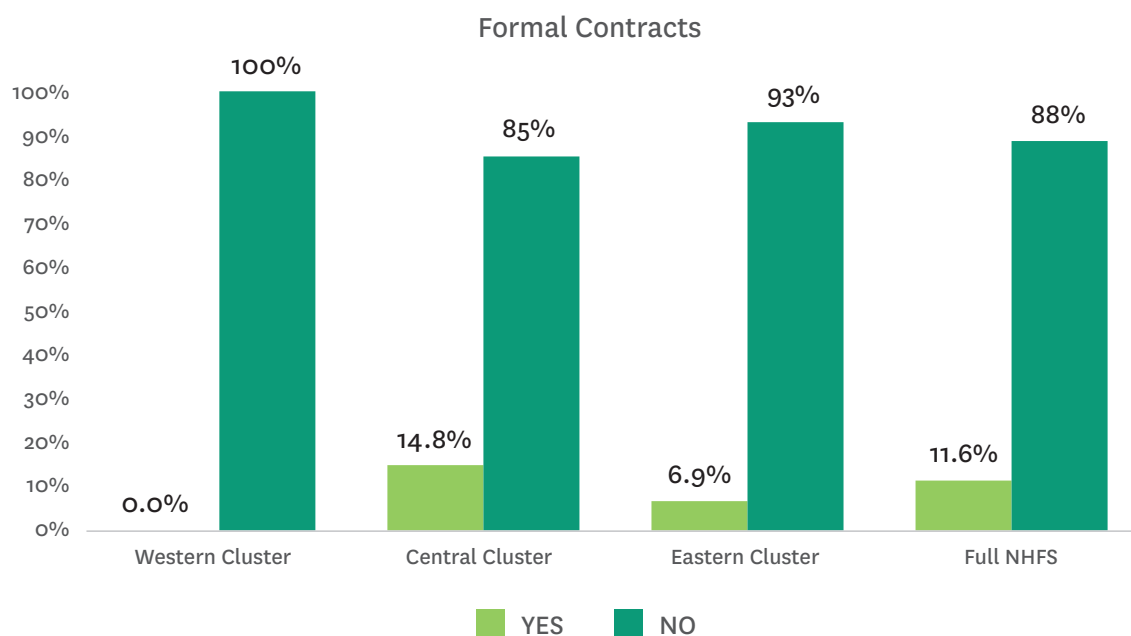
Formal contracts for PES were also uncommon in all the clusters. Out of those who received PES, only 12 percent reported having received a formal contract. Central Cluster reported the highest incidence of formal contracts at 15 percent followed Eastern Cluster at seven percent of HHs. In Western Cluster, no HHs reported having received a formal contract.

What Do the Data Tell Us?

Few HHs reported benefiting from PES or similar approaches in all three clusters, less than one percent of HHs overall. This suggests there is significant room to increase awareness and expand the coverage of such schemes. PES schemes could perform an important role by providing economic opportunities and protecting ecosystem services contributed by forests.

4.2.5 CHANGING FORESTS

4.2.5.1 Observing and Contributing to Change

Key Results

- **23 percent** of HHs reported a decrease in forest cover.
- **43 percent** of HHs cleared forest land in the last 5 years, while **26 percent** cleared forest in the last 12 months.
- Out of those HHs that cleared land in the last 12 months, **44 percent** cleared old-growth natural forest.
- **92 percent** of HHs cleared forests for cultivating crops such as rice and cassava in the last 12 months.

Key Insights

- HHs themselves have contributed to the dynamic nature of forest cover, with **42 percent** of HHs reporting to have cleared forests and **19 percent** reporting to have planted trees in the last five years.
- The need for food and timber were behind many of the HHs motivation for clearing forests for cultivation or planting new trees.

Survey Responses: Changes in Forest Cover and HH Forest Activity

The survey asked HHs whether they had observed any changes in the forests and whether these changes were an increase in forest cover or a decrease over the last five years. They were also asked whether forest cover had increased or decreased in the past five years and what the activities were that may have influenced this.

Figure 45

Figure 45 Percentage of HHs who Reported Seeing Changes in Forest Cover Over the Last Five Years
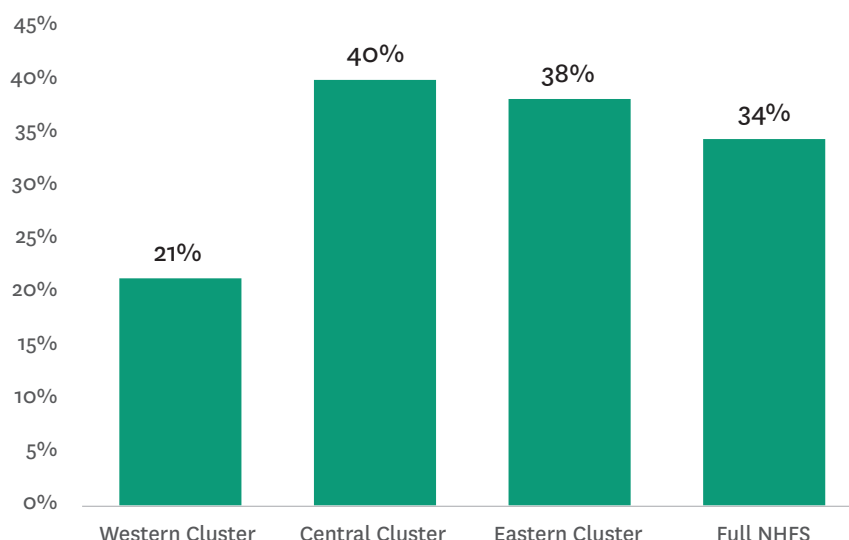
Even though a higher percentage reported no changes to forest over the last five years, 34 percent reported seeing some changes. There were some differences between clusters with the highest number of HHs in Central Cluster reporting changes (40 percent) and the lowest number of HHs in Western Cluster at 21 percent.

Figure 46 Was Forest Change Increasing or Decreasing Over the Last Five Years? (% of all HHs)
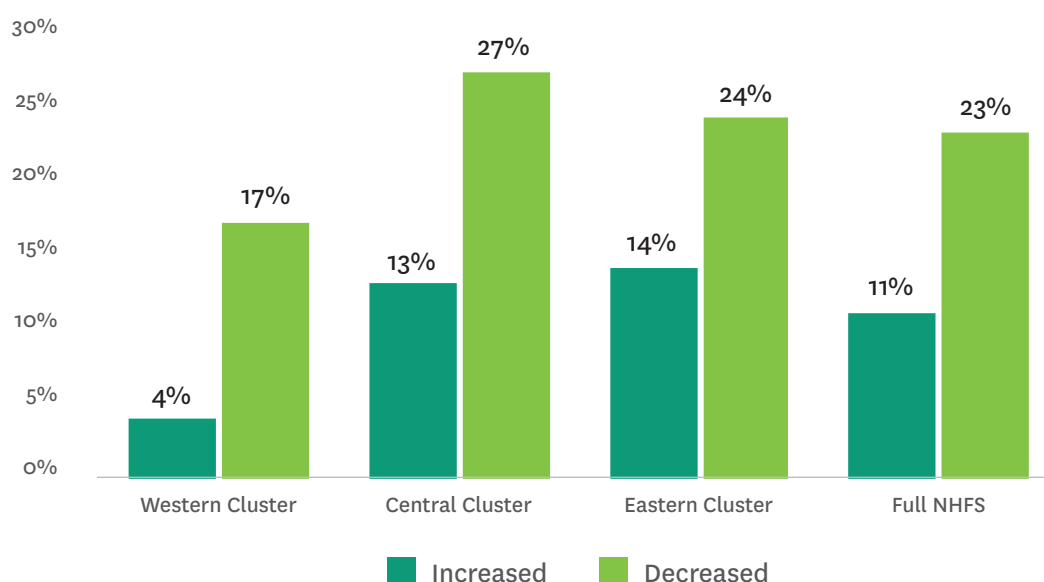
The survey then asked the HHs whether the changes they had seen were increases in forest cover or decreases. About 23 percent of all HHs reported a decrease in forest cover and 11 percent saw an increase.

Figure 47 | **Percentage of HHs who had Cleared Land, Abandoned Land and Planted Trees During the Last Five Years (% of HHs)**

Cleared Land

NO 57% YES 43%

Abandoned

NO 59% YES 41%

Planted

YES 19% NO 81%
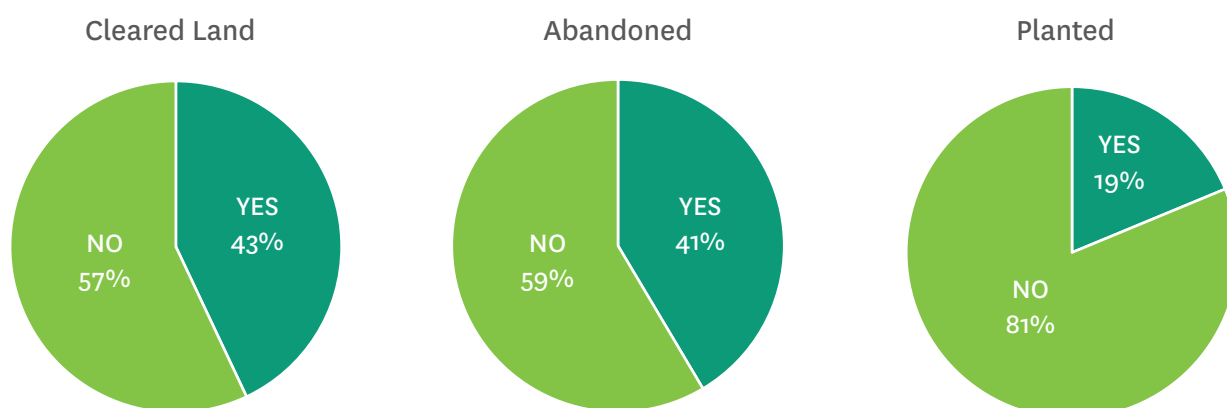
An average of 43 percent of HHs had been involved with clearing forests over the previous five years. About 41 percent of HHs stated they had abandoned land used in general. About 19 percent reported planting trees over the past five years.

Figure 48 | **Reason for Planting in Forests Over the Last Five Years (% of HHs Planting Trees)**
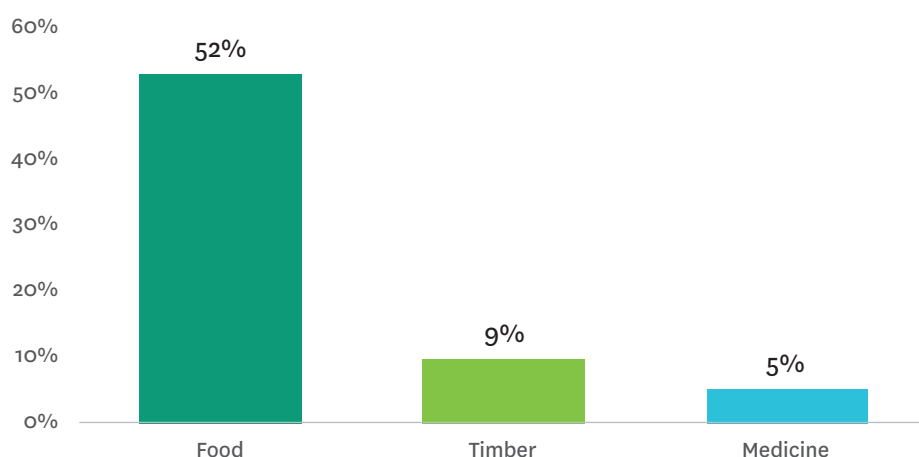
Out of the HHs that planted trees in forest areas, a majority (52 percent) of those planted trees for food purposes over the last five years. Planting trees for timber was reported by nine percent of HHs and for medicinal plants by five percent. The data clearly support the hypothesis that HHs rely on forests to meet HHs needs for food, timber, and medicine.

The survey then asked HHs for more detail about the forest clearance they had been involved in during the last 12 months. They were asked about the type of forests they cleared, average amount of forest area cleared, and the reasons for clearing.

Figure 49 **Percentage of HHs involved in Clearing Forest in the Last 12 Months**
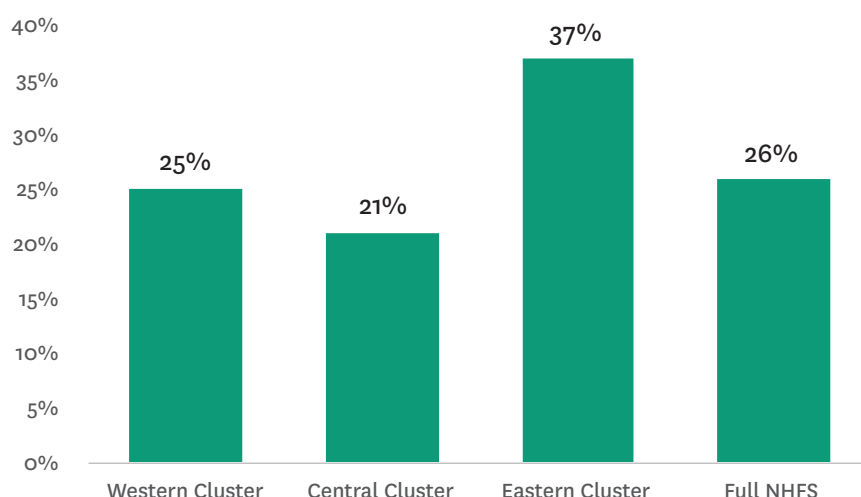
In the last 12 months, 26 percent of HHs across the whole NHFS reported clearing forest. A higher percentage of HHs in the Eastern Cluster cleared forest (37 percent) in the past year, followed by Western (25 percent) and Central Cluster (21 percent).

Figure 50 **Mean Acres cleared in the Last 12 Months (% of HHs Involved with Clearing Forest)**
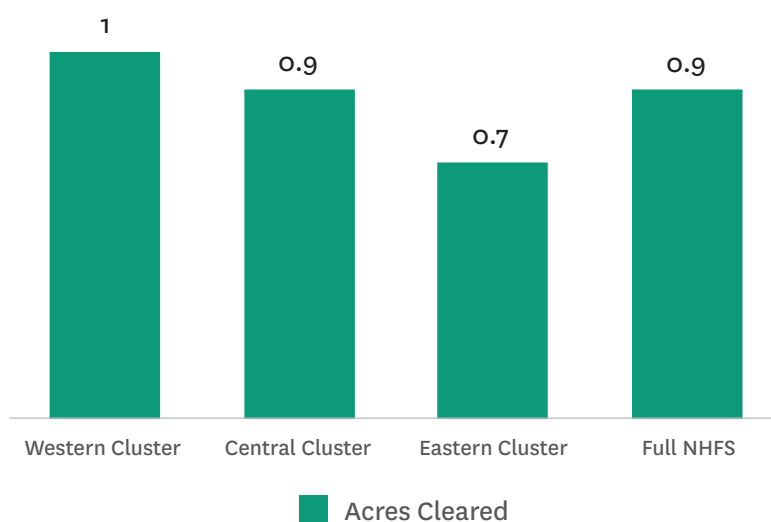
HHs cleared an average of 0.9 acres of forest area during a year. This varied from one acre in the Western Cluster to 0.9 acres in the Central Cluster and 0.7 acres in the Eastern Cluster.

Figure 51

Types of Natural Forest Cleared by HHs in the past 12 months (% of HHs who cleared land)
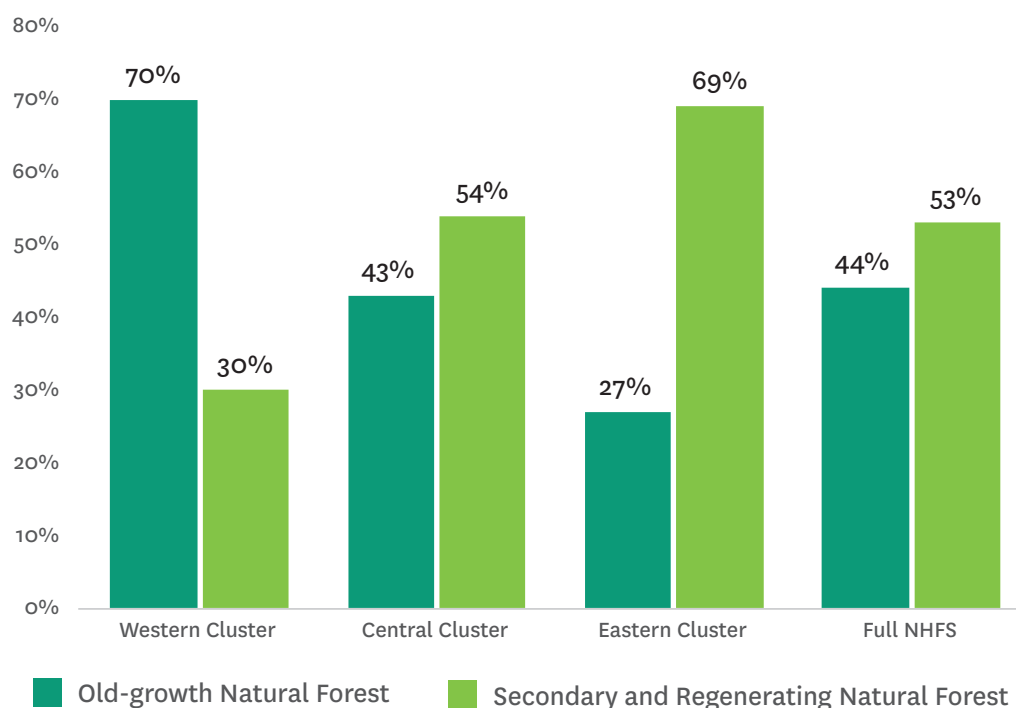
Out of those HHs that cleared land in the last 12 months, 44 percent cleared old-growth natural forest and 53 percent cleared secondary or regenerating natural forest. A higher percentage of HHs in the Western Cluster cleared old-growth natural forests (70 percent) compared to the Central and Eastern Clusters (43 and 27 percent respectively). On the other hand, a higher percent of HHs in the Eastern Cluster cleared secondary or regenerating natural forest (69 percent) compared to the Central and Western Clusters (54 and 30 percent respectively).

Figure 52 | Percentage of HHs that Cleared Land to Plant Crops in the Last 12 Months
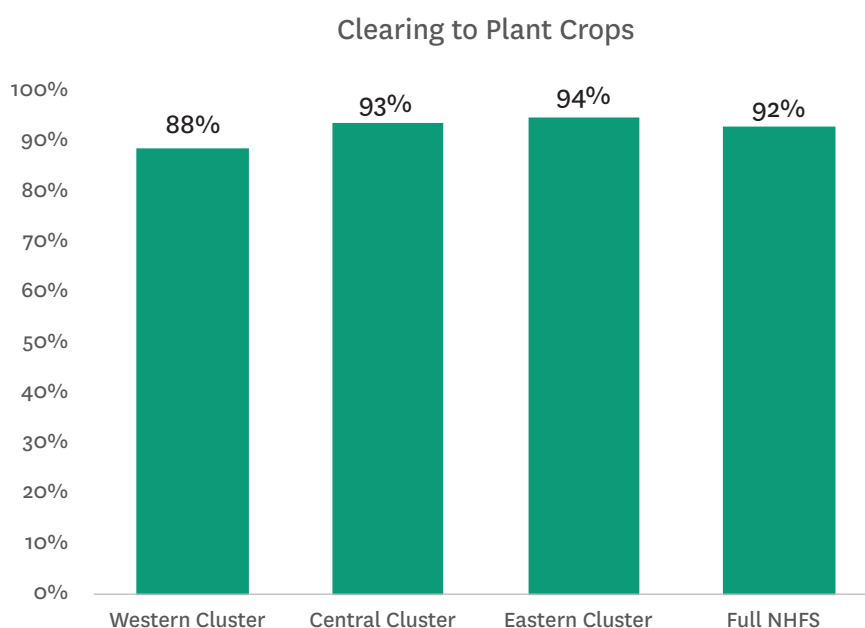
The primary reason for clearing forest was to plant crops. A majority of HHs (92 percent) reported cropping as the most important reason for clearing forests. A higher percentage of HHs in Eastern Cluster cleared forest for cropping (94 percent), followed by the Central Cluster (93 percent), and the Western Cluster (88 percent).

Figure 53 | Top Three Crops Planted in Cleared Areas in the Last 12 Months (% of HHs who Cleared for Cropping)

Top Three Crops
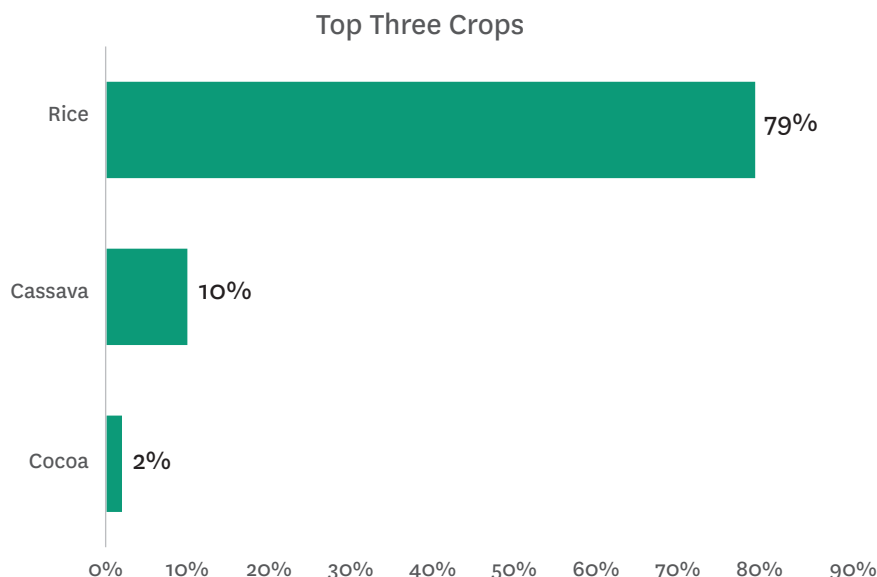
The HHs also reported on the primary crops they planted in forest areas they had cleared in the last 12 months. On the basis of frequency of response, 79 percent of HHs reported planting rice. Much lower numbers of HHs reported planting Cassava (10 percent) and cocoa (two percent).

What Do the Data Tell Us?

Forest cover is changing slowly but more forest cover was decreasing rather than increasing. Although the majority of HHs reported no or little change in forest cover over the last five years, more decreases in forest cover were reported than increases.

Nearly half of HHs reported being involved with clearing forest, and the main reason for clearing forest was for food. Only 19 percent of HHs were involved with planting trees. The main reasons given for planting trees were for food, timber and for medicine, and the most common reason was for food.

Old-growth natural forest and secondary natural forest was cleared by approximately half of HHs that cleared forest. The main reason given for forest clearing was to cultivate crops like rice and cassava, important dietary sources for HHs.

These data support the hypothesis that most of HHs rely on forests to meet the most basic HHs needs, that is food, shelter, and medicine.

4.3 COMMUNITY RESPONSES

Forest-Proximate Communities are Highly Dependent on Forests for Their Livelihoods Needs

- 95 percent of communities confirmed they collected products from forests. The top three products collected were: (1) Fuelwood; (2) Poles; and (3) Leaves.
- The top three cash-generating forest products collected by communities for income purposes were: (1) Bushmeat; (2) Timber; and (3) Gold.
- Formal and informal rules had an impact on how forest products were collected. However, community awareness about these rules varied.
- The majority of communities reported that rules were set by the community heads.
- Both men and women (but especially men) felt that women should be encouraged to participate more in meetings related to forest decisions.

As described in the sampling section of this report, 250 communities were interviewed using the community questionnaire. Five community questionnaires were not usable for various reasons.[52] The communities were distributed across the three clusters. See Table 6 to see the numbers of communities in each cluster.

Table 6 | Number of Community Questionnaires in Each Cluster

	Numbers of Community Questionnaires in each Cluster
Western Cluster	78
Central Cluster	89
Eastern Cluster	78
Full NHFS	245

The community questionnaires were administered using facilitated focus groups. Community members included both men and women. They discussed a particular question among themselves and provided a consensus answer. The responses to the questions were recorded. This approach allowed more information to be gathered on how the communities perceived the value of the forest. It also provided insight into what the forest benefits were, and what kind of support the communities received from the government to help them use forest resources for livelihood and incomes. For information on the types of topics explored with the community members, see Figure 2. NHFS Survey Modules.

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52 There were two cases in which the same enumeration area (EA) was duplicated and three cases in which the EA did not match the EA identifiers of the household (HH) survey.

In the case of the gender module, the responses were gathered twice, the first by a female only group and the second by a male only group. This allowed for a comparison of any differences in perceptions by the two sexes.

4.3.1 FOREST PRODUCTS

4.3.1.1 Top Forest Products Collected by the Communities

Key Results

- **95 percent** of communities confirmed they collected products from forests.
- The top three products collected were:
  - o **Fuelwood**
  - o **Poles**
  - o **Leaves.**
- Rattan, bamboo, fronds and timber were also collected by over **80 percent** of the communities across the three clusters.
- Collecting of these products is a year-round activity with no marked seasonality.

Key Insights

- Forest communities collect a large variety of forest products to fill their livelihood and subsistence needs.
- The importance of forest products for rural communities is undeniable, and access to and sustainability of production of these products needs to be considered in any poverty reduction strategy.

Survey Responses: Top Forest Products

Communities were asked if they collected forest products and which were the most important products they collected. They were also asked what months of the year they collected these products.

Figure 54 | Percentage of Communities that Collected Forest Products
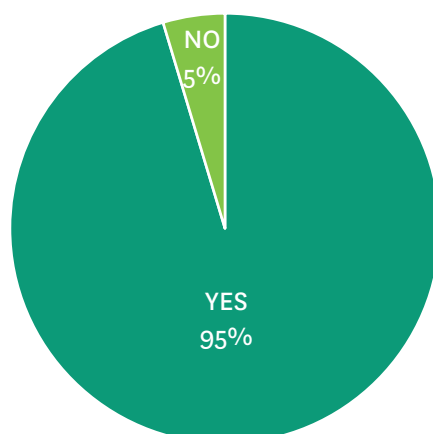
The communities confirmed that most of them were involved with collecting forest products. On an average, 95 percent of communities collected forest products, while five percent did not.

Figure 55 │ The Top Seven Forest Products Collected in the Last 12 Months
(% of Communities)
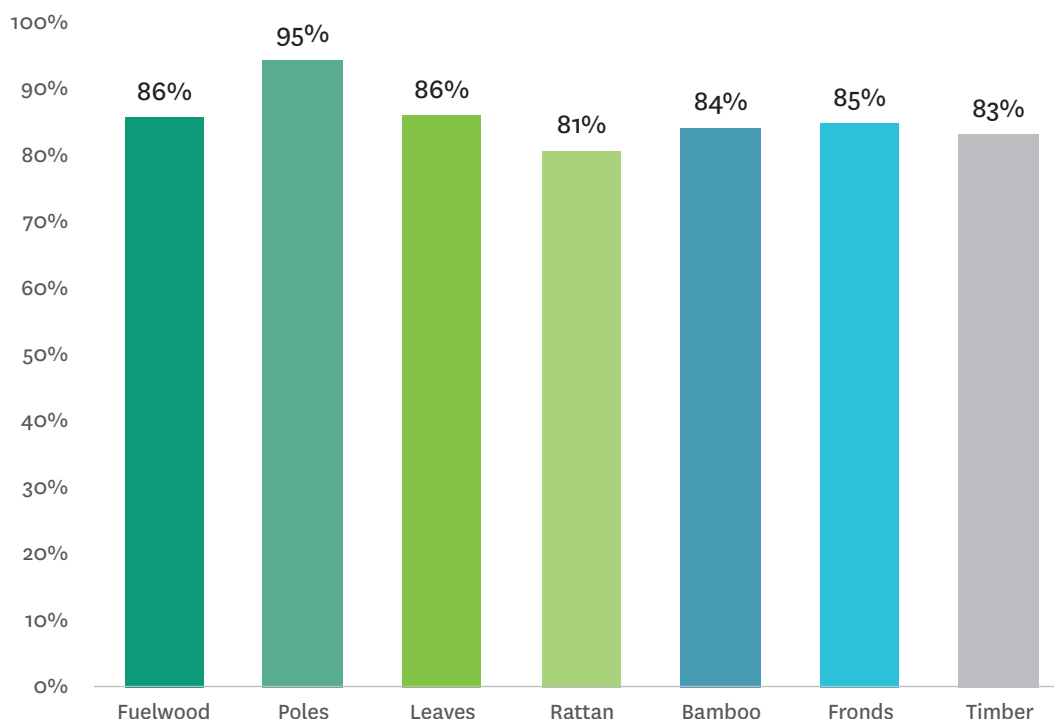
Overall, communities reported high collection rates of a wide range of products. However, poles stood out as being a key product, with 95 percent of communities collecting them. Fuelwood and leaves were the next two highest products collected, both at 86 percent.

Figure 56 │ All Clusters – Monthly Collection Rates (% of Communities)

All Clusters

Between 69 and 85 percent of the communities continued to collect these forest products throughout the year. However, at cluster level, some products were collected at slightly different rates depending on the time of the year. See Figure 57, Figure 58, and Figure 59. Data is indicated for year 2017 as the last full year preceding the survey.

Figure 57 Western Cluster – Monthly Collection Rates (% of Communities)
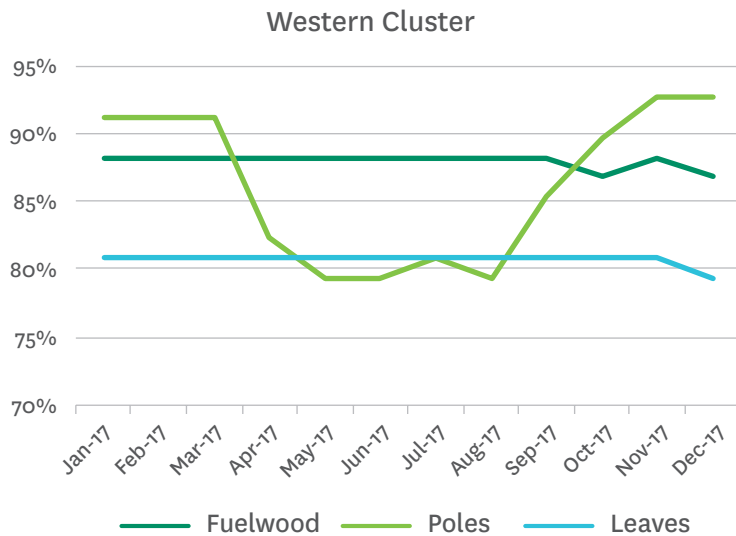
Western Cluster

In Western Cluster, a high proportion of communities (80 to 90 percent) collected these (mentioned in the legend) top three products throughout the year. However, while the collection of fuelwood and leaves remained steady through the year, the collection of poles dipped from 91 percent in March down to 81 percent from April through to September, the reduction likely due to the rainy season.

Figure 58 │ Central Cluster – Monthly Collection Rates (% of Communities)
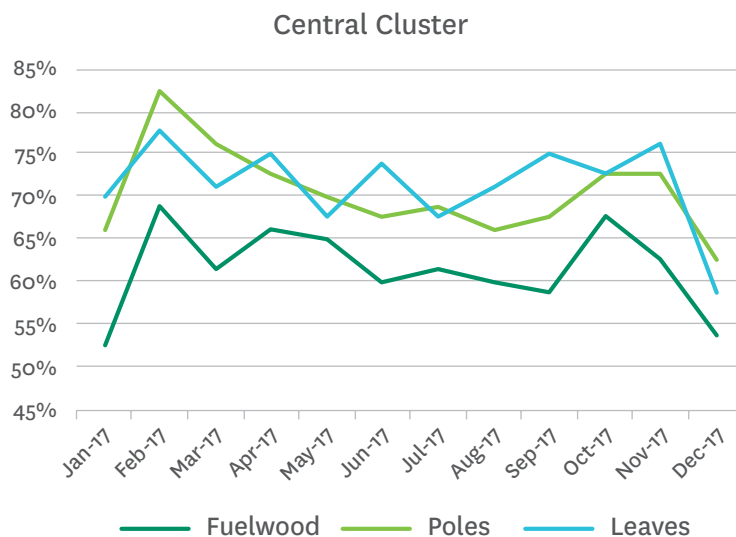
Central Cluster

In the Central Cluster, while all three products fluctuated throughout the year, the collection of fuelwood was lower than the other two clusters. This varied between 50 and 70 percent depending on the time of the year. In addition, a smaller proportion of communities, between 50 to 80 percent, reported being involved all the year round.

Figure 59 │ Eastern Cluster – Monthly Collection Rates (% of Communities)
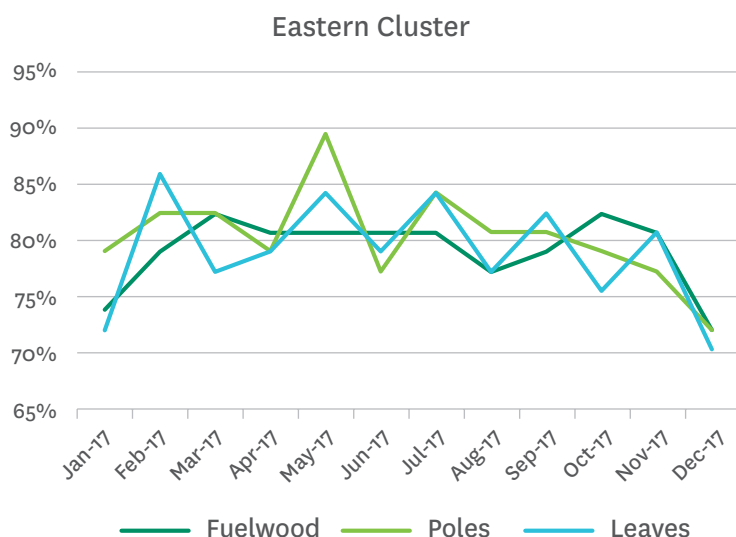
Eastern Cluster

In the Eastern Cluster, the collection rates for all three products varied throughout the year. Rates ranged between 70 to 90 percent.

What Do the Data Tell Us?

Nearly all communities engaged in the collection of forest products, albeit it at slightly different rates depending on the month. The most noticeable trends were that Central Cluster tended to collect less fuelwood than the others and the collection of poles by Western Cluster dipped between April and September. In addition, Central Cluster had slightly lower collection rates in general compared to the others.

In Central Cluster, the relatively low proportion of communities engaged in the collection of these products could be due to the relatively lower proportion of dense canopy cover forests. Central Cluster has only 17 percent of dense canopy cover compared to Western and Eastern Clusters, both of which have over 50 percent.

4.3.1.2 Collecting Forest Products for Income Purposes

Key Results

- The top three cash-generating forest products collected by communities for income purposes were:
    1. **Bushmeat,**
    2. **Timber,** and
    3. **Gold**
- Only about half the communities were aware of both formal and informal rules related to the collection of these products.
- **46 percent** of communities reported that rules were made by community heads.
- Subsistence-orientated users and small-scale commercial users were more or less equally represented in the communities (except for Western Cluster).
- Western Cluster had a very low percentage of small-scale commercial users involved with collecting income-generating forest products.

Key Insights

Gold was identified by the communities as the third most important product collected for income purposes. Policy makers need to be aware that should access to collecting gold be reduced or stopped completely, communities living near forests would struggle significantly.

Survey Responses: Using Forest Products to Generate Income

Communities were asked what the three most important cash or income-generating forest products were for the livelihood of the people in their community. They were also asked about the rules governing the extraction of these products, and how easy it was to access them.

Figure 60 | The Top Three Forest Products Used to Generate Income in the Last 12 Months (% of Communities)
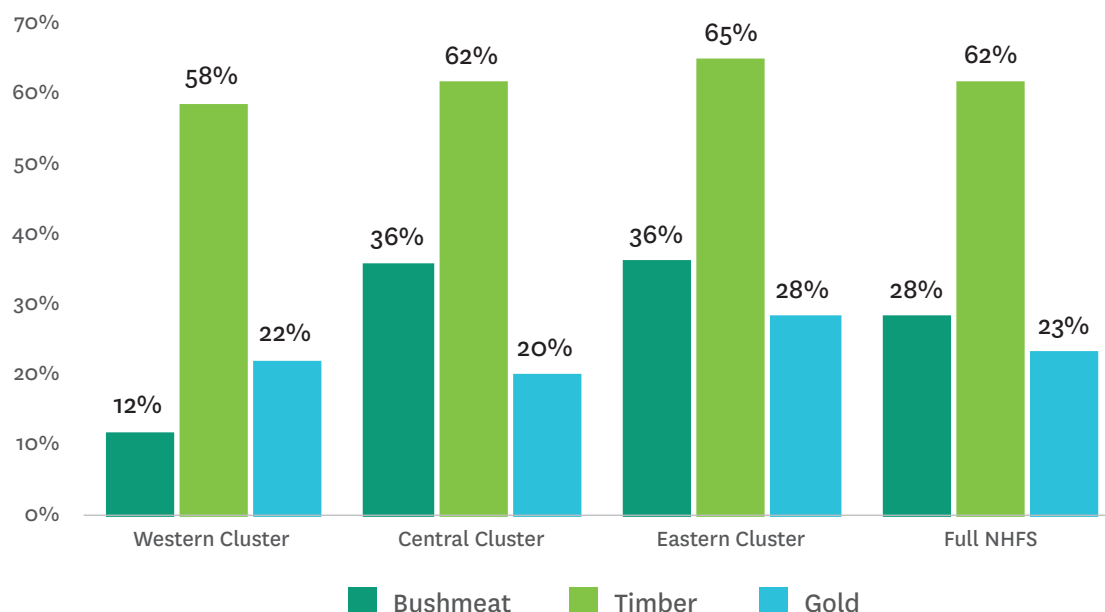
Timber was used the most for cash or income generation purposes by all three clusters. An average of 62 percent of the communities used timber and all three clusters used timber at a similar rate.

Bushmeat and gold were the other two top forest products used to generate income. An average of 28 percent of communities used bushmeat for income and 23 percent of communities used gold. However, Western Cluster used bushmeat the least at only 12 percent, compared to Central and Eastern Clusters at 36 percent.

Figure 61 | Community Awareness of Formal and Informal Rules for Collection of Bushmeat, Timber and Gold (% of Communities)
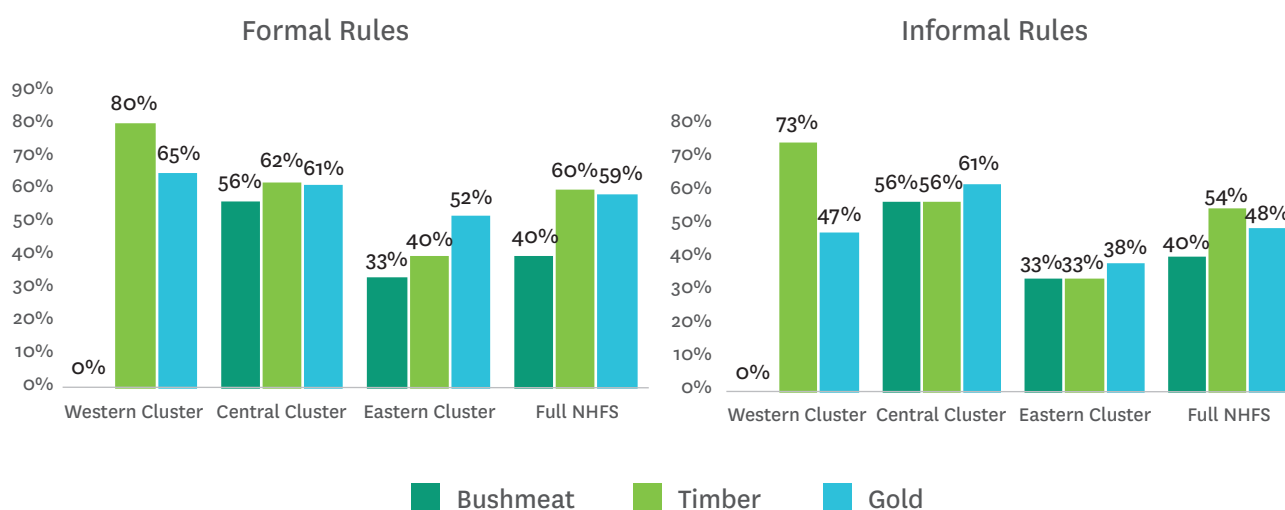
While formal and informal rules exist for all three top products, awareness of these rules varied between the communities. About 59 percent of the communities knew about formal rules governing the collection of timber and gold, while 40 percent were aware of similar rules about bushmeat.

Half of the communities were aware of the informal rules governing timber (53 percent) and gold (48 percent) while about 40 percent were aware of rules governing bushmeat. It is interesting though that none of the communities in Western Cluster were aware of there being any formal or informal rules governing the collection of bushmeat.

Table 7 | Who Makes the Rules? (% of Communities)

	Community Head	Community Forest Associations	Forest Officer	Other Government Department	Private Landowners	Private Company
Western Cluster	61%	4%	1%	0%	0%	0%
Central Cluster	46%	6%	4%	0%	2%	0%
Eastern Cluster	30%	20%	3%	0%	0%	1%
Full NHFS	**46%**	**10%**	**3%**	**0%**	**1%**	**0%**

The survey responses showed that community heads were the principal rule-setters. This was especially the case in Western Cluster where 61 percent of rules were made by community heads. In Eastern Cluster it was a lot less with only 30 percent of community heads making the rules.

The responses also showed that forestry officers, other government agencies and private companies have little say in rule-setting. The same was true for community forest associations. However, in Eastern Cluster, 20 percent reported that community forest associations had a role in setting rules.

Figure 62 | How Rules Impact on Community Choices (% of Communities)

Impact of Rules on Communities

People and Forests Interface: Contribution of Liberia's Forests to Household Incomes, Subsistence, and Resilience
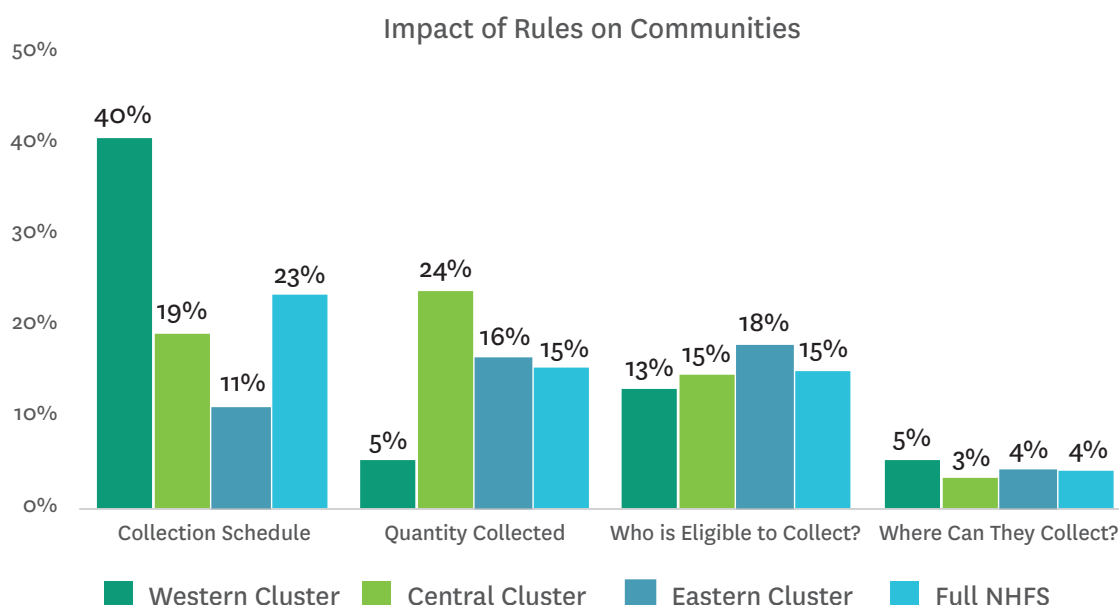
While rules can change how people behave, the communities reported that the rules did not have a big impact on their activities. Time taken to extract products was affected the most at 23 percent. Fifteen percent of communities said that it reduced the number of products they collected while 15 percent also said that less people were allowed to harvest because of the rules. Interestingly, the location of the harvesting was hardly affected at all (four percent).

The impacts of rules varied across clusters. In Western Cluster, the highest proportion of communities (40 percent) perceived the impact to be the time taken to collect these products. Central Cluster reported that rules affected the quantity of the product collected (24 percent). Eastern Cluster reported that the biggest impact was seen to be on who was eligible to collect forest products (18 percent).

Figure 63 | Percentage of Communities Reporting Subsistence-Orientated and Small-Scale Commercial Users Collecting Bushmeat, Timber and Gold for Income Purposes
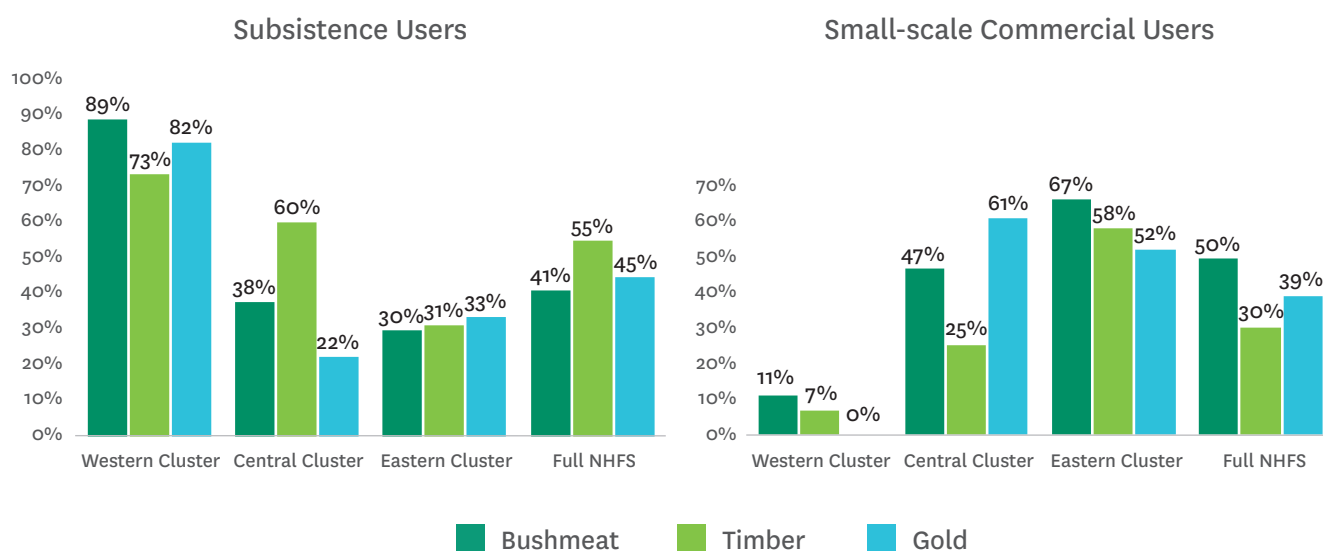
There were two types of user groups involved with collecting forest products for income purposes:
1. Subsistence-oriented users.
2. Small-scale commercial users.

While on average the different types of users were fairly well represented, some differences across clusters were apparent. In Western Cluster, it was subsistence-oriented users that dominated collection. In Eastern Cluster, it was small-scale commercial users instead.

Western Cluster also had very few small-scale commercial users. The communities from Western Cluster reported only 11 percent of small-scale commercial users collecting bushmeat and no small-scale commercial users collecting gold. Whereas communities in both Central and Eastern Clusters reported that 52 and 61 percent of gold was collected by small-scale commercial users.

What Do the Data Tell Us?

The one noticeable observation was that Western Cluster was unaware of there being any formal or informal rules relating to the collection of bushmeat. This is also in the context that bushmeat was mainly collected in Western Cluster by subsistence-orientated users (89 percent) compared to only 11 percent of small-scale commercial users. When communities are struggling with food insecurity, the pressure on them is to consume resources to the expense of everyone else and the environment.[53] This is known as a 'tragedy of the commons', and the data suggest that Western Cluster is at much higher risk of this.

Gold was also identified by the communities as the third most important product collected for income purposes.[54] This suggests that should access to collecting gold be reduced or stopped completely, communities living near forests would struggle significantly. Policy and law makers need to be aware of the importance gold has for these vulnerable communities and ensure that alternatives are made available if need be.

4.3.1.3 Collecting Forest Products for Subsistence Purposes

Key Results

- Top three products used for subsistence purposes were:
  1. **Bushmeat**,
  2. **Fuelwood**, and
  3. **Fish**
- Some communities were more aware than others about rules on collection.
- Rules were mostly set by the community head.

Key Insights

- Fuelwood, bushmeat and fish gathering fill significant subsistence needs for forest-proximate communities.
- Small-scale commercial users are also involved in the collection of these products.
- Awareness of the rules under which collection takes place varies across products and clusters.

Survey Responses: Using Forest Products for Subsistence

Forest products also play an important role for subsistence needs rather than just income purposes. Communities were asked what top three forest products they collected for subsistence purposes. They were asked what they knew about the rules governing the extraction of these products, and how easy was it for them to access these products.

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53 See: https://www.econlib.org/library/Enc/TragedyoftheCommons.html
54 Note that income from gold is excluded from "forest income" in Figure 63. Rather, it is reported in a separate category.

Figure 64 | Top Four Subsistence Forest Products (% of Communities)

Top Four Subsistence Forest Products

Legend: Western Cluster, Central Cluster, Eastern Cluster, Full NHFS

	Collection Schedule	Quantity Collected	Who is eligible to collect?	Where can they collect?
Western Cluster	48%	14%	27%	39%
Central Cluster	28%	33%	11%	15%
Eastern Cluster	30%	48%	23%	6%
Full NHFS	35%	31%	20%	20%
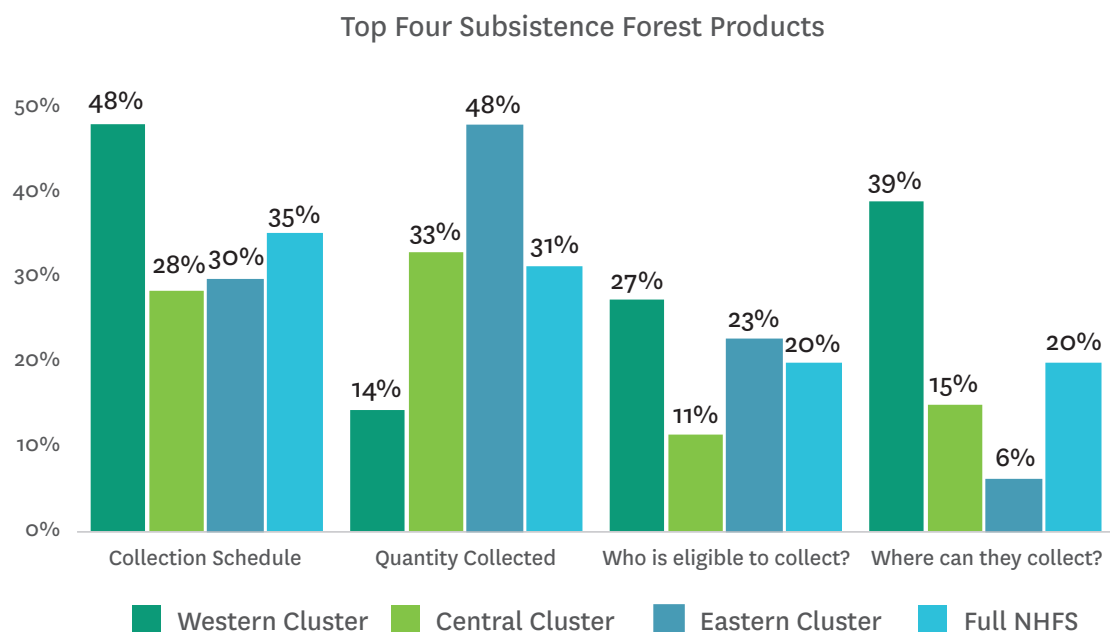
Communities identified bushmeat (35 percent), fuelwood (31 percent), fish and makindo palm (20 percent each) as the top three forest products most important for their subsistence. However, these products rated differently across clusters. In Western Cluster, bushmeat was rated as the most important product in 48 percent of communities. Fuelwood was rated as the most important product for Central Cluster at 33 percent and Eastern Cluster at 48 percent.

Figure 65 | Community Awareness of Formal and Informal Rules for Collection of Subsistence Bushmeat, Fuelwood and Fish (% of Communities)

Formal Rules

	Western Cluster	Central Cluster	Eastern Cluster	Full NHFS
Bushmeat	32%	80%	57%	52%
Fuelwood	55%	28%	0%	18%
Fish	24%	80%	19%	34%

Informal Rules

	Western Cluster	Central Cluster	Eastern Cluster	Full NHFS
Bushmeat	38%	68%	57%	52%
Fuelwood	55%	21%	0%	16%
Fish	33%	70%	19%	36%

Legend: Bushmeat, Fuelwood, Fish
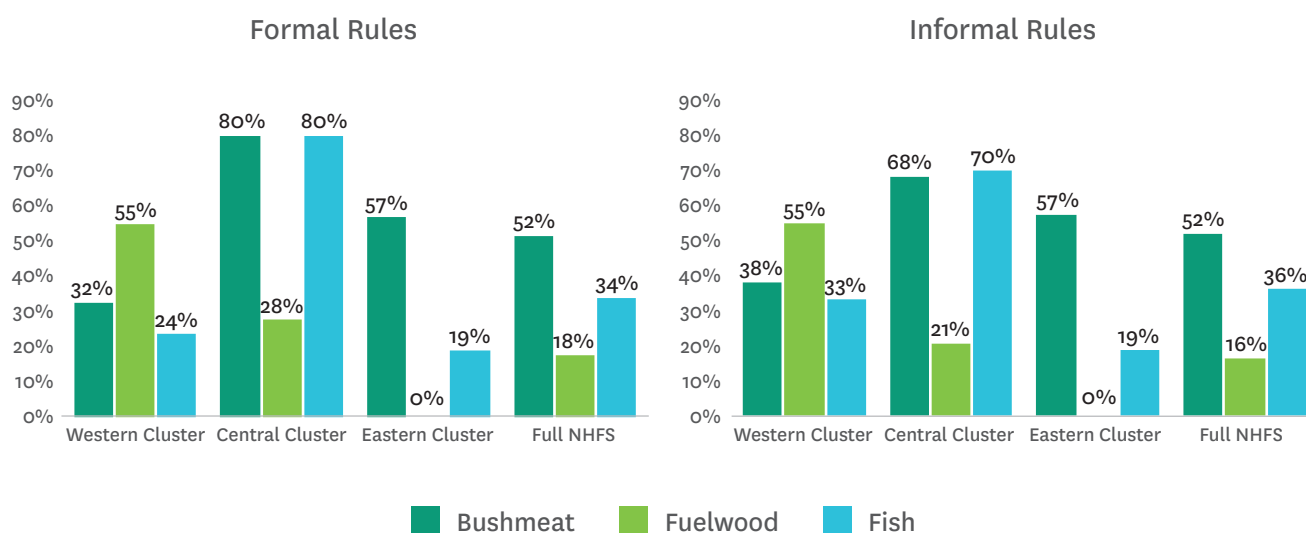
As in the case of products that generate an income, formal and informal rules also applied to the collection of these subsistence products. The highest number of communities (52 percent) reported that both formal and informal rules related to the collection of bushmeat. Fish had slightly less rules reported at 34 and 36 percent, and fuelwood even less at 18 and 15 percent.

However, some clusters were less aware of these rules than others. For instance, 55 percent of Western Cluster said that formal and informal rules applied to the collection of fuelwood. Conversely, communities in Eastern Cluster thought that no rules applied to fuelwood. The rules around the collection of fish were also reported differently. In Central Cluster, 80 percent of communities reported there were informal rules around the collection of fish, while in Eastern Cluster only 34 percent reported informal rules.

Table 8 | **Who Makes the Rules? (% of Communities)**

	Community Head	Community Forest Associations	Forest Officer	Other Government Department	Private Landowners	Private Company
Western Cluster	45%	0%	0%	0%	0%	0%
Central Cluster	45%	5%	1%	0%	1%	0%
Eastern Cluster	15%	18%	0%	0%	0%	0%
Full NHFS	**36%**	**7%**	**0%**	**0%**	**0%**	**0%**

The majority of clusters reported that rules were set by the community heads. In both Western and Central Clusters 45 percent of the communities identified the community heads as the main rule-setter. However, Eastern Cluster reported that community forest associations had a greater role in making rules than community heads, only 15 percent stated rules were made by community heads versus 18 percent reported they were made by community forest associations. Across all the clusters, forestry officers, other government agencies and private companies were identified as having little say in rule-setting.

Rules also had an impact on how the products were extracted.

Figure 66 | **How Rules Impact Community Choices (% of Communities)**

Impact of Rules

Western Cluster   Central Cluster   Eastern Cluster   Full NHFS

Communities perceived that the biggest impact caused by these rules was on the quantity of product they were able to collect (17 percent). This was followed by the time it took to collect (16 percent) and who was allowed to collect (11 percent). However, these rules appeared to have little influence on where they were able to collect products from (3 percent). Western Cluster stated that the rules affected collection times the most (27 percent) and for Central and Eastern Clusters the biggest affect was on the amount they were able to collect (25 percent and 20 percent respectively).

Overall, the majority of these products were collected by subsistence-oriented users in the

Figure 67 | Percentage of Communities Reporting Subsistence-Orientated Users and Small-Scale Commercial Users Collecting Bushmeat, Timber and Gold for Income Purposes
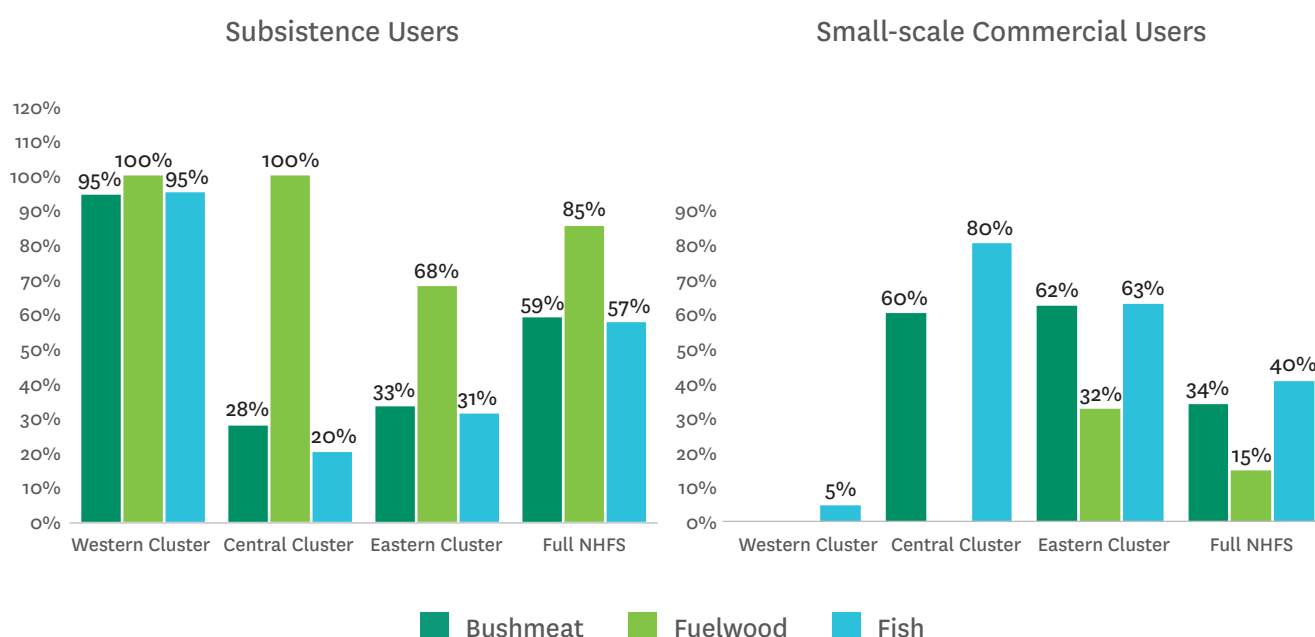
communities with less being collected by small-scale commercial users. Communities reported that subsistence-oriented users collected 85 percent of fuelwood, 59 percent of bushmeat and 57 percent of fish.

In Western and Central Clusters, 100 percent of subsistence-oriented users collected fuelwood, whereas in Eastern Cluster, it was only collected by 68 percent of users. In the case of bushmeat, in Western Cluster, 95 percent of subsistence users collected this product, but in Central and Eastern Clusters, only about 30 percent of users collected this. For fish, the pattern across clusters was similar with 95 percent subsistence-oriented users collecting fish compared to 31 percent in Central Cluster and 20 percent in Eastern Cluster.

Overall, small-scale commercial users were involved much less with collecting these products for subsistence. It was reported that bushmeat was collected by 33 percent of small-scale commercial users, fuelwood by 16 percent and fish by 40 percent. However, Eastern Cluster had much higher rates of small-scale commercial users collecting these products and Western Cluster reported hardly any small-scale commercial users collecting these products.

What Do the Data Tell Us?

The top four products identified by forest-proximate communities as important for filling significant subsistence needs were fuelwood, bushmeat, makindo palm, and fish. The split between collection by subsistence users and small-scale commercial users varied markedly across the clusters but, broadly speaking, small-scale users were more active in the collection of bushmeat and fish.

Because small-scale commercial users were also involved in the collection of these products, it is reasonable to assume that the trade and marketing of these products are a valuable source of incomes and livelihoods as well.

4.4.1 PARTICIPATION, SUPPORT AND GENDER

4.4.1.1 Participating in Forest-Related Programs

Key Results

- **75 percent** of communities reported not having participated in any forest-related programs over the last five years.
- Rates of participation on forest-related programs during the last 12 months were even lower.
- The majority of communities perceived these programs as beneficial to the environment and to their livelihoods.

Key Insights

Though the incidence of forest-related program participation was low, a large proportion of participating communities reported that these programs have had a positive impact on forests (sustainable use, biodiversity conservation) and on their welfare (incomes and employment).

Survey Responses: Community Participation and Benefits

The survey explored with communities the extent to which they had participated in any forest-related programs. Communities were asked whether, over the past five years, they had participated in any program related to sustainable forest management (including logging), biodiversity conservation, watershed protection, forest fires and pest control, grazing management, and improving forest access. They were also asked to report on whether they felt these programs had provided any positive impacts.

Figure 68 **Percentage of Communities who Participated in a Program in Last Five Years**

Participation in Any Program
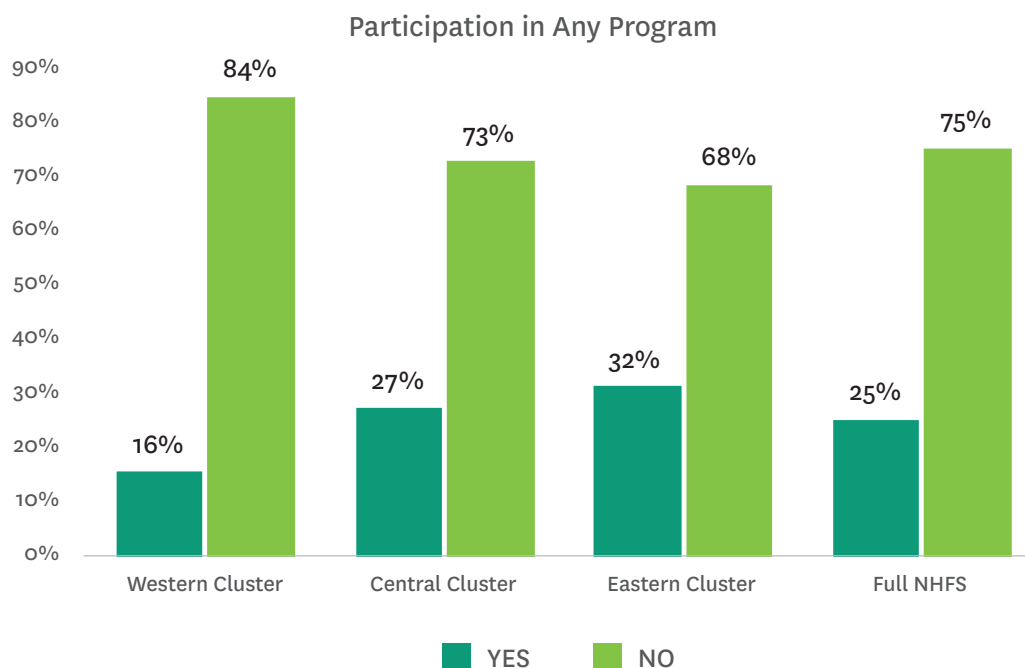
On average, the majority of communities (75 percent) reported that they had never participated in any forest-related programs. Out of those who reported having participated, most came from Eastern Cluster (32 percent) and the least came from Western Cluster (16 percent).

Figure 69 **Percentage of Communities Participating in Programs (Five Years and 12 Months)**
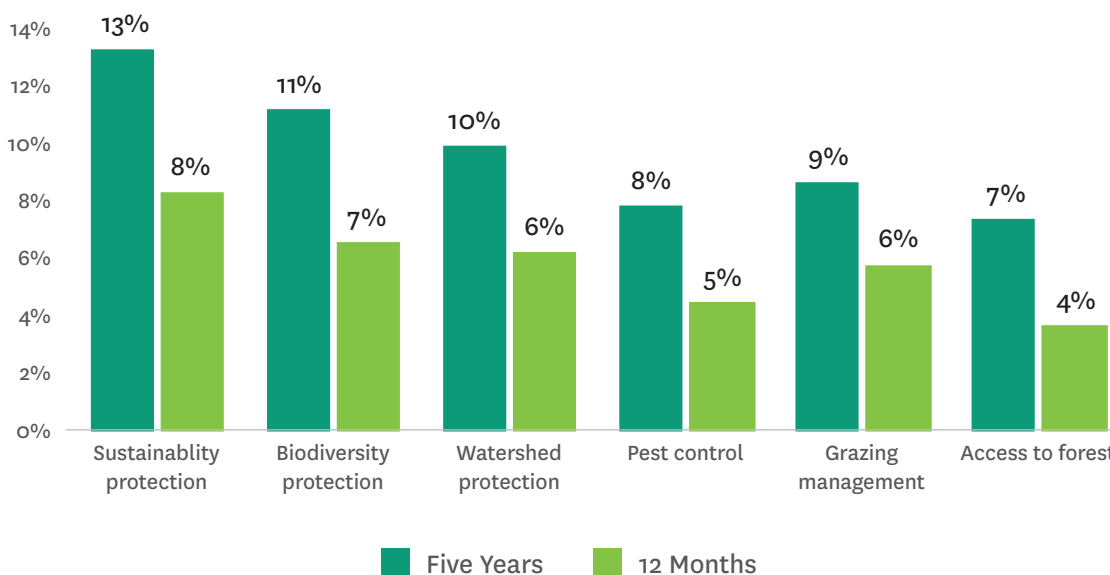
Rates of participation on programs during the last five years was also low. The highest level of participation reported was on programs focused on the sustainable use of forests (13 percent across all communities). Participation in biodiversity protection programs was also one of the highest at 11 percent, along with watershed protection at 10 percent. The other forest-related programs had a slightly smaller percentage of community participation including grazing management (nine percent), forest fires and pest control (eight percent) and permitting access to forest (seven percent).

Participation during the last 12 months was even lower. Only eight percent of communities reported participating in sustainable forest programs, while participation in biodiversity protection and watershed protection programs declined to seven percent and six percent respectively.

Figure 70 | Reported Positive Impacts of Forest-Related Programs (% of Communities)
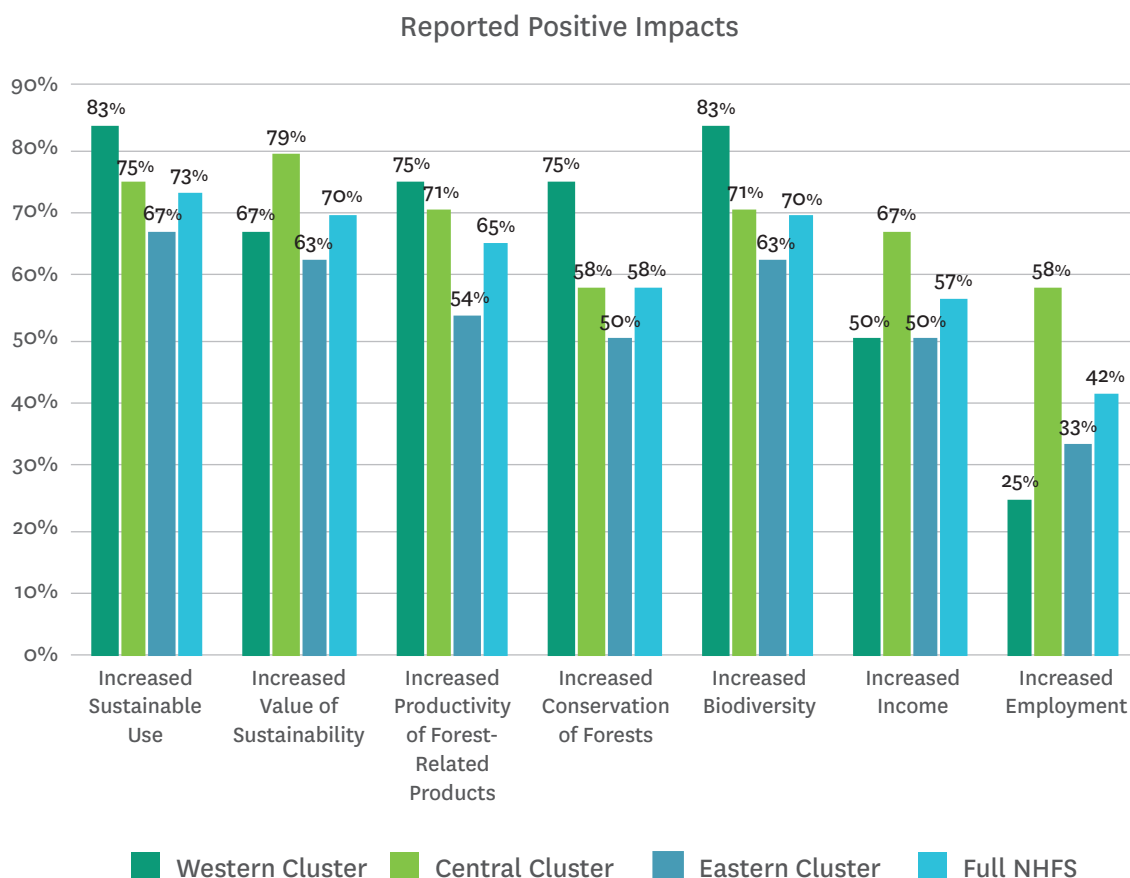
However, regardless of the declines in participation, communities reported that these programs had had a positive impact on forests and on their welfare. Out of all the communities that participated in forest-related programs, 73 percent identified an increase in the sustainable use of forests as a positive impact and 58 percent reported an increase in forest conservation. In addition, 42 percent of the communities saw increased employment as a benefit to participating in these programs.

There were also were some differences across the clusters. Western Cluster reported a high rate of positive impacts in the areas of increased sustainable use (83 percent), increased biodiversity (83 percent), increased production of forest products (75 percent), and increased conservation of forests (75 percent) Conversely, Central Cluster perceived that the highest benefits related to increased value of sustainability (79 percent), and increased income (67 percent) and employment (58 percent).

Figure 71 | Who Participates in Forest-Related Programs – Men or Women?
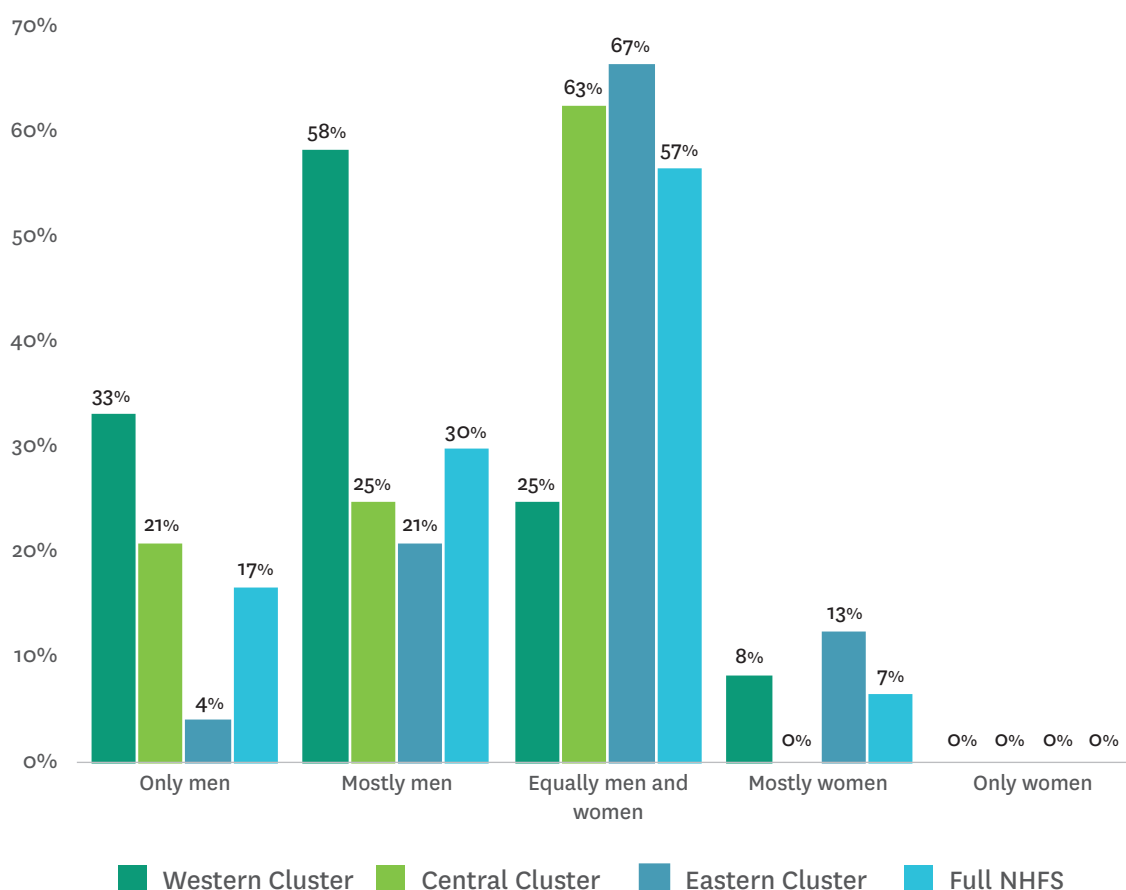
The perception of who participated was not gender neutral either. While 57 percent of communities reported that men and women benefited equally, 30 percent reported that mostly men benefited more than women and 17 percent reported that only men benefited. Overall, only seven percent thought that mostly women benefited. In Western Cluster, perceptions were that a majority of men benefited, 58 percent being mostly men, and 33 percent being only men.

What Do the Data Tell Us?

Forest-related programs are important for enhancing the environment and protecting and building forest-related livelihoods. Communities who live near these forests are highly dependent on these forests.

Two trends emerged from the analysis.

1. Participation in these forest-related programs over the last five years was quite low and has declined during the previous 12 months.
2. Communities who participated in these programs appreciated the positive contributions in terms of improvements in the forests and their own incomes and employment.

4.4.1.2 Specific Inputs from Support Programs

Key Results

- **84 percent** of communities reported not receiving any specific inputs from forest-related programs over the last five years.
- **46 percent** of specific inputs were provided by the government.
- Numbers of communities receiving specific inputs during the last 12 months were even lower.
- Policy information, technical assistance and management training were the benefits most received.
- Free inputs such as seedlings, implements and fertilizer were received by very few communities.
- The majority of communities perceived these inputs as positive, especially by Western Cluster.

Key Insights

Although the support has been modest (and has declined in the past 12 months), a large proportion of the communities reported that the support has had a positive impact on their forests (sustainable use, productivity, biodiversity conservation) and on their welfare (incomes and employment).

Survey Responses: Support and Inputs Provided for Forest-Related Activities

Forest-related programs often provide specific inputs into local communities. Communities were asked whether, over the past five years, they had received external support, and if so, what kind of support had they received. These types of support included training in forest management, forest product processing, information on forest laws and policies, or received free seedlings, implements or other inputs (such as fertilizers).

Figure 72

Percentage of Communities who Received Support in Last Five Years
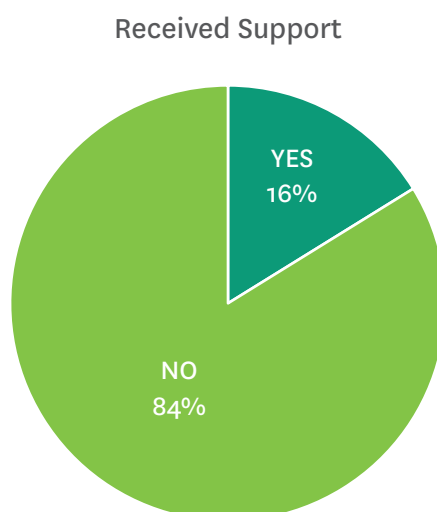
Received Support

Overall, the majority of communities reported having received no support from these programs. Only 16 percent of the communities reported receiving any external support for forest-related activities over the past five years.

Figure 73 | Types of Organization the Support Came From

Reported Source of Support
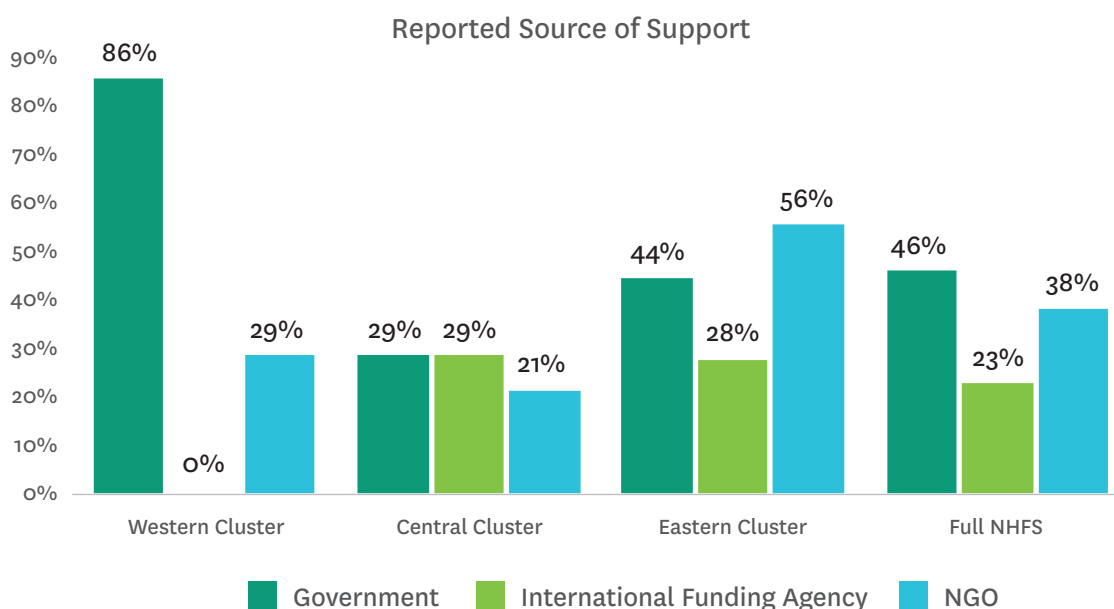
Communities reported that most of the support programs they benefited from were provided by the government. They reported that 46 percent of support came from government, 38 percent from nongovernmental organizations (NGOs) and 23 percent from international funding agencies. Interestingly, Western Cluster reported a high level of government input (86 percent) and zero input from the international funding agencies and Eastern Cluster reported that NGOs (56 percent) were the most active.

Figure 74 | Types of Support Received Over the Last Five Years

Five Years

Legend: Western Cluster | Central Cluster | Eastern Cluster | Full NHFS
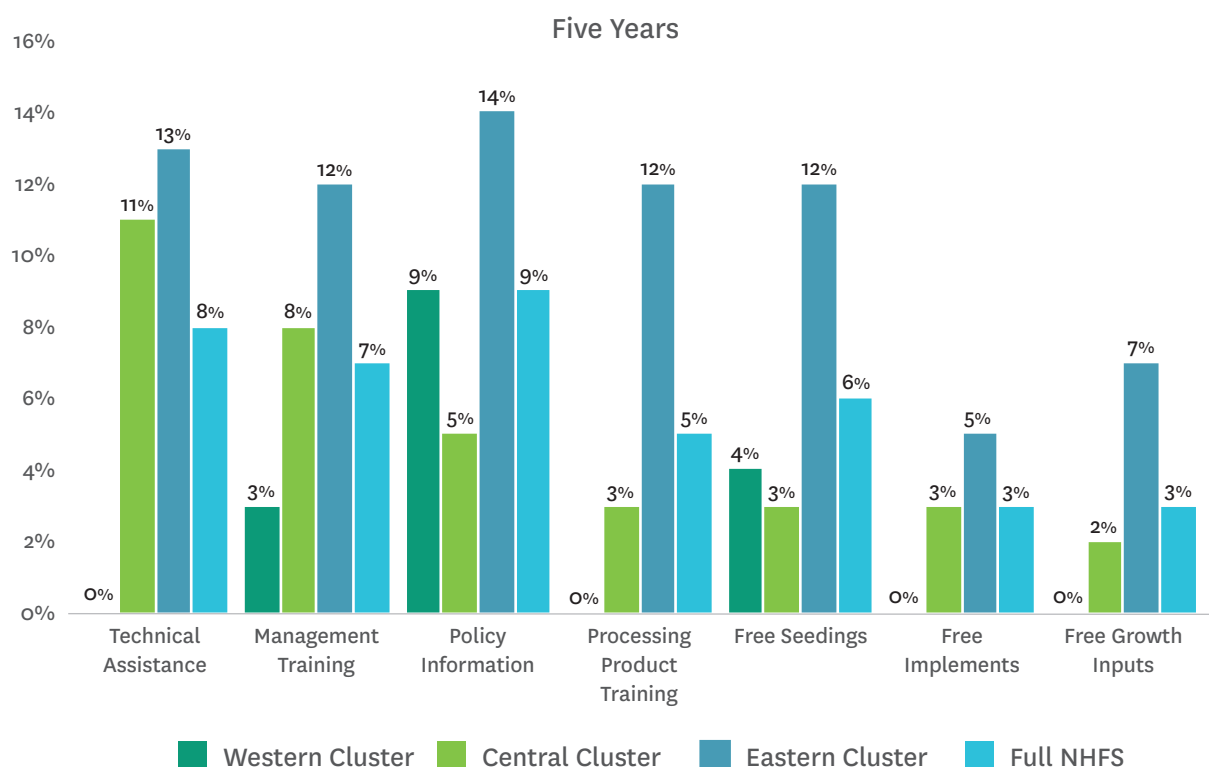
While the majority of respondents reported not receiving any support from programs over the last five years, the numbers reporting receiving specific types of support were even lower. More of the communities received external support in the form of technical assistance, management training and policy information than they did free inputs. Policy information was the highest reported type of support but at only nine percent. Technical assistance came next at eight percent and management training next at seven percent.

Fewer communities received external support in the form of free supply of inputs. Free seedlings were the largest free resource received by communities but still only at six percent. An equal percentage of communities (three percent each) received free implements for forestry operation and growth protection inputs like fertilizers for forests.

The numbers across clusters also varied. Eastern Cluster appears to have benefited the most for all types of support ranging from 4 percent for free implements to nine percent for policy information and free seedlings. Western Cluster reported receiving policy information (six percent), management training (three percent) and free seedlings (one percent). They reported receiving no processing product training, no free implements and no free growth inputs (such as fertilizers).

Figure 75 | Types of Support Received over the Last 12 Months

12 Months

Western Cluster ■ Central Cluster ■ Eastern Cluster ■ Full NHFS
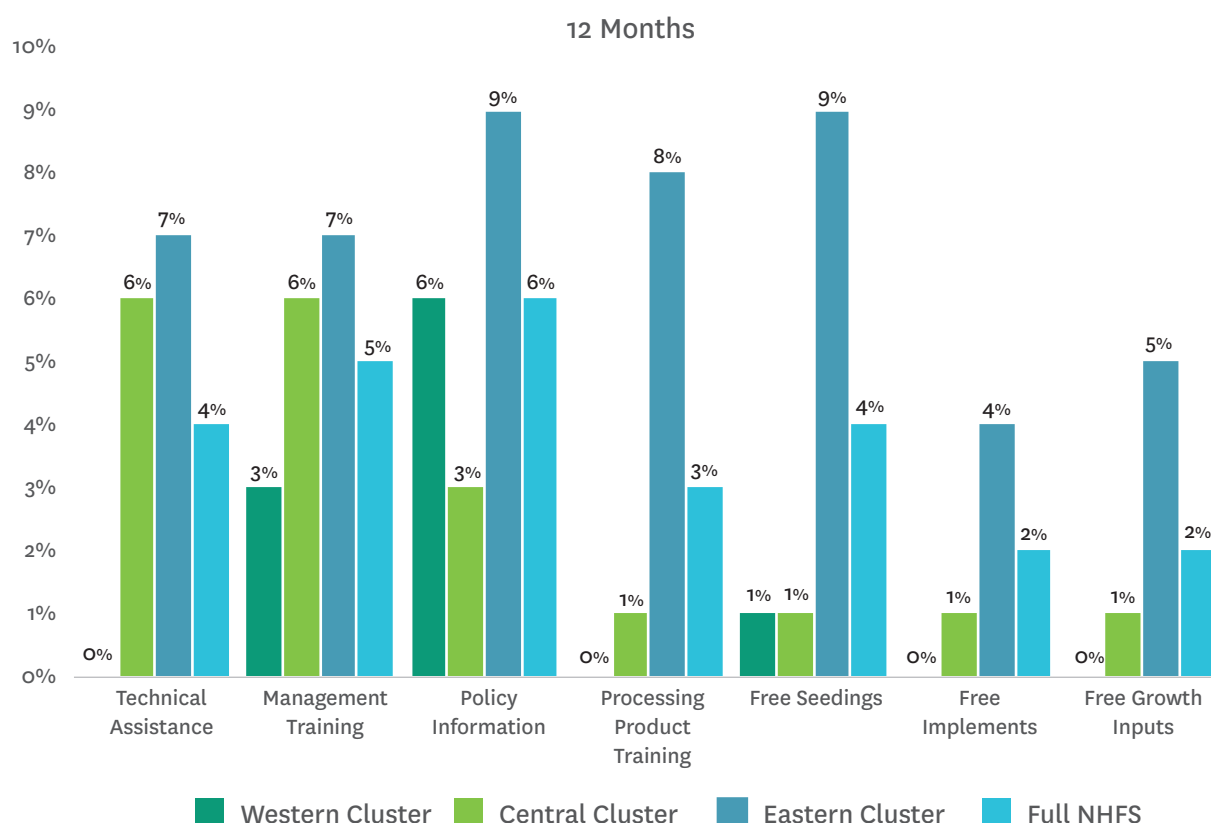
Over the last 12 months, communities reported receiving less support inputs that then they did over the previous five years. Only six percent of the communities received any policy information compared to nine percent over the last five years. In addition, the percentage of communities receiving support on technical assistance for forestry practices was halved in the last 12 months from eight percent to four percent. Management training fell from seven percent to five percent and training support on forest product processing fell from five percent to three percent.

Similarly, the numbers of communities receiving free supplies of resources also declined. Reports of receiving free seedlings, forest implements and growth inputs like fertilizers, all declined by one to two percent each.

Figure 76 | Reported Positive Impacts of Specific Inputs

Figure 76 | Reported Positive Impacts of Specific Inputs
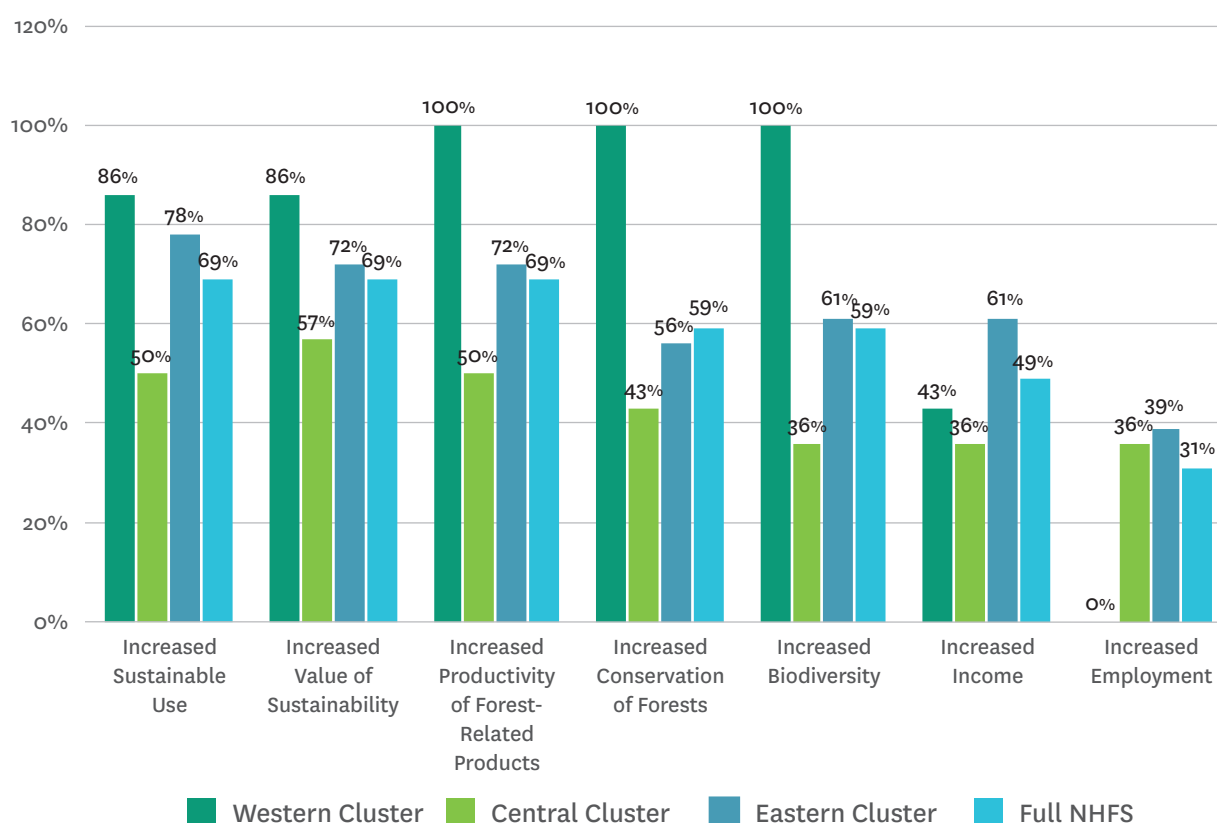
However, these inputs were still perceived as being positive by a majority of communities. Overall, 69 percent of communities reported that some of the benefits were increased sustainable use, increased value of sustainability and an increase in the production of forest-related products. An increase in conservation of forests (59 percent), biodiversity (59 percent), income (49 percent) and employment (31 percent) were also reported by the communities.

There were some differences reported across the clusters. Western Cluster reported the highest percentages for increased sustainable use and increased value of sustainability (both at 86 percent). Western Cluster also reported rates of 100 percent for increased production of forest-related products, increased conservation of forests and increased biodiversity. Central and Easter Clusters reported lower benefits. For Central Cluster, increased value of sustainability was most significant at 57 percent and for Eastern Cluster it was increased sustainable use at 78 percent.

What Do the Data Tell Us?

Data indicate that the support provided to communities had been modest and had declined in the past 12 months. However, a large proportion of the communities reported that the support had a positive impact on their forests (sustainable use, productivity, and biodiversity conservation) and on their welfare (incomes and employment).

Data also showed that Eastern Cluster communities received the most support from the various types of programs. Government support has benefited communities in all three clusters; it has had the largest engagement in Western Cluster. NGO support programs have been most active in Eastern Cluster.

4.4.1.3 Gender and Economic Activity

Key Results

- **36 percent** of men and **34 percent** of women reported on the existence of forest-related businesses in the community.
- Both men and women agreed that the majority of decision makers were male.
- Both and men and women agreed that more women should have a role in forest-related business.

Key Insights

- Forest-related businesses operate in about one-third of the communities, most of which are managed by men. There is scope to increase the role of women as managers of such businesses.

Survey Responses: Gender and Economic Activity

The survey explored the role of gender with regard to forest-related economic activity. It asked about the existence of forest-related business, who were the most involved - men or women, and whether they thought that women should have a greater role.

Figure 77 Gender Knowledge About the Existence of Forest-Related Businesses (% of Communities)

Do Forest-related Businesses Exist?
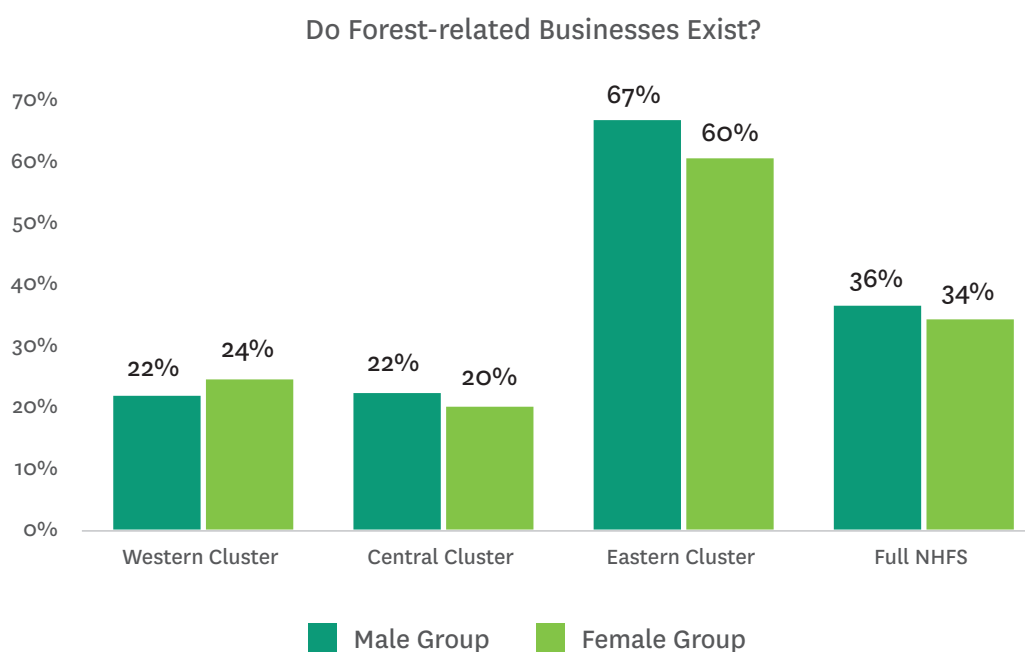
On average, 36 percent of male and 34 percent of female groups reported being aware of the existence of forest-related businesses in their communities. Male and female focus groups in Western and Central Clusters had similar levels of awareness, whereas in Eastern Cluster slightly more men were aware of forest-related businesses than females (67 percent compared with 60 percent).

In addition, there was a significant difference in reporting rates between Eastern Cluster and the other two clusters. Between 20 to 24 percent of respondents in Western and Central Clusters reported being aware of the existence of forest-related businesses. Whereas, communities in Eastern Cluster reported three times the amount of forest-related businesses compared to the other clusters (67 percent of men and 60 percent of women).

Figure 78 | Percentage of Male and Female Groups who Reported Forest-Related Businesses were Managed by Men

Are Forest-related Businesses Managed by Men?
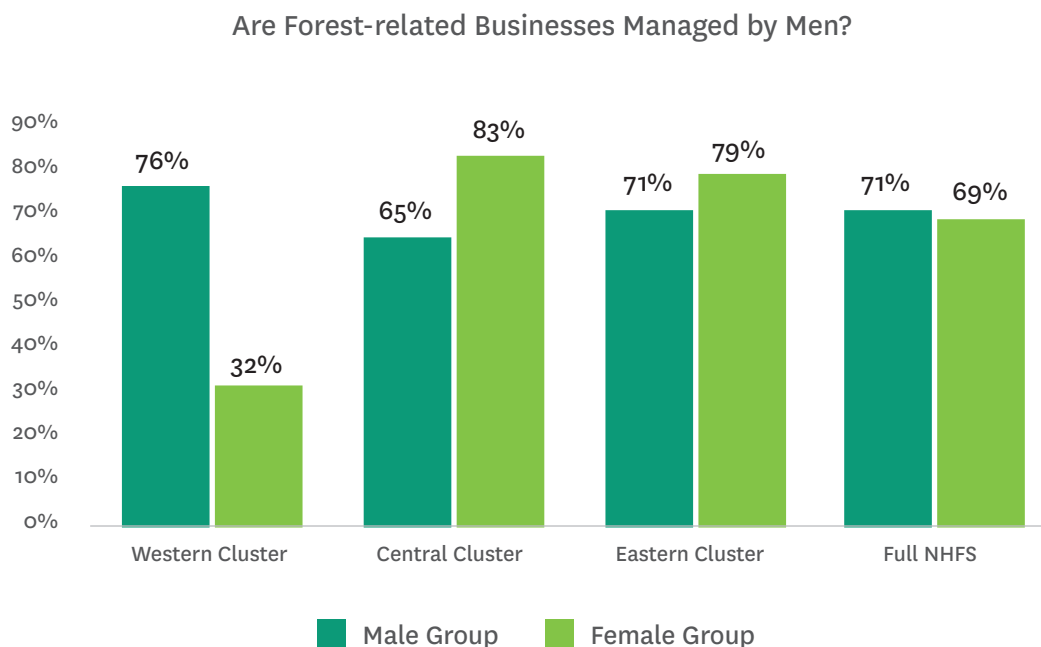
The communities were also asked whether it was men or women who were the decision makers of forest-related businesses. Both men and women reported that the majority of decision makers were men. In the male group, 71 percent of communities said it was men and in the female group 69 percent said it was men. However, the difference in perception was marked in the case of Western Cluster. The male group from Western Cluster reported that 76 percent of decision makers were male, and the female group reported a much lower figure of 32 percent.

Figure 79 Percentage of Male and Female Groups who Think Women Should Have a Greater Role

Should Women Have a Greater Role?
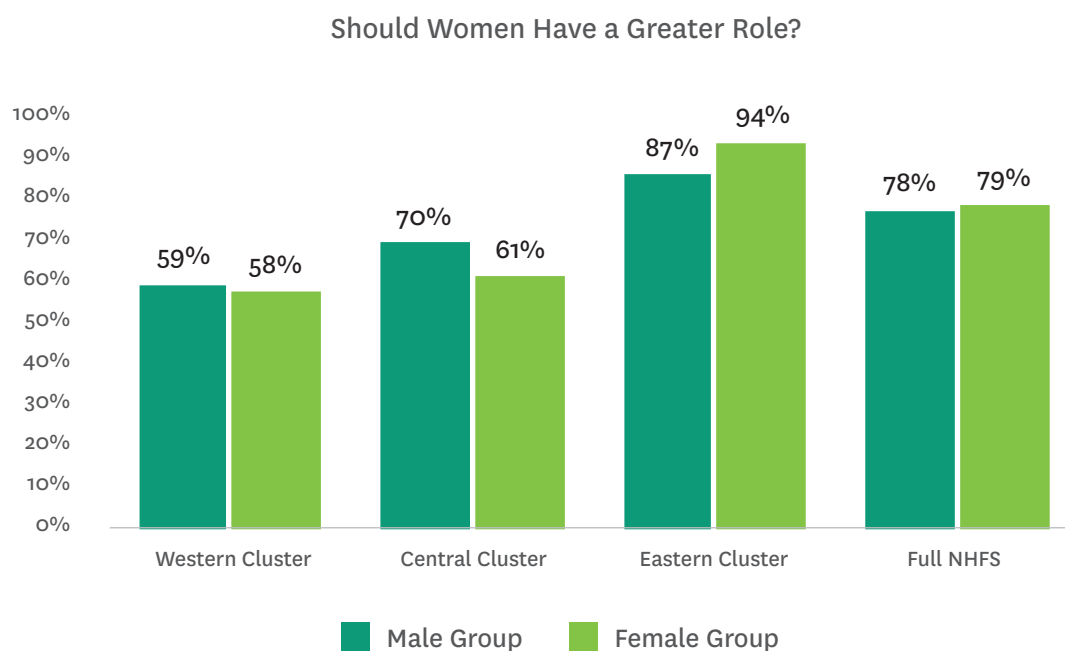
Overall, the majority of communities agreed that women should have a greater role in managing forest-related businesses. In addition, both men and women were in equal agreement on this (78 percent and 79 percent).

Eastern Cluster had the highest proportion of support with 87 percent of males and 94 percent of females in agreement. The other clusters were lower especially Western Cluster where only 59 percent of males and 58 percent of females agreed. This could be due to Eastern Cluster having the highest proportion of dense forest cover forests whereby they perceive women's role to be critical to management of forests and forest-related businesses.

What Do the Data Tell Us?

On average, one-third of the communities reported the existence of forest-based enterprises, most of which were managed by men. Although there are variations in the perceptions between men and women, across the clusters, nevertheless, both men and women agree that women should take on a greater role in managing such enterprises.

4.4.1.4 Gender, Community Meetings, and Participation

Key Results

- Community level meetings to discuss forest usage are convened fairly regularly in about one-third of communities.
- HHs were represented by both men and women, although slightly more by men.

Key Insights

- Overall, women's participation in these meetings is high, as reported by both men and women groups. Women's opinions are given due importance at these meetings. However, both men and women agreed that greater participation by women should be encouraged.

Survey Responses: Gender Participation at Community Meetings on Forest Usage

The survey explored the extent to which men and women were involved in community meetings on forest usage. Men and women were asked about the frequency of community meetings, the level of participation, and whether women should be involved more. The same set of questions were asked separately to men and women groups, across the whole community group.

Figure 80 | Frequency of Community Meetings According to Male and Female Groups (% of Communities)
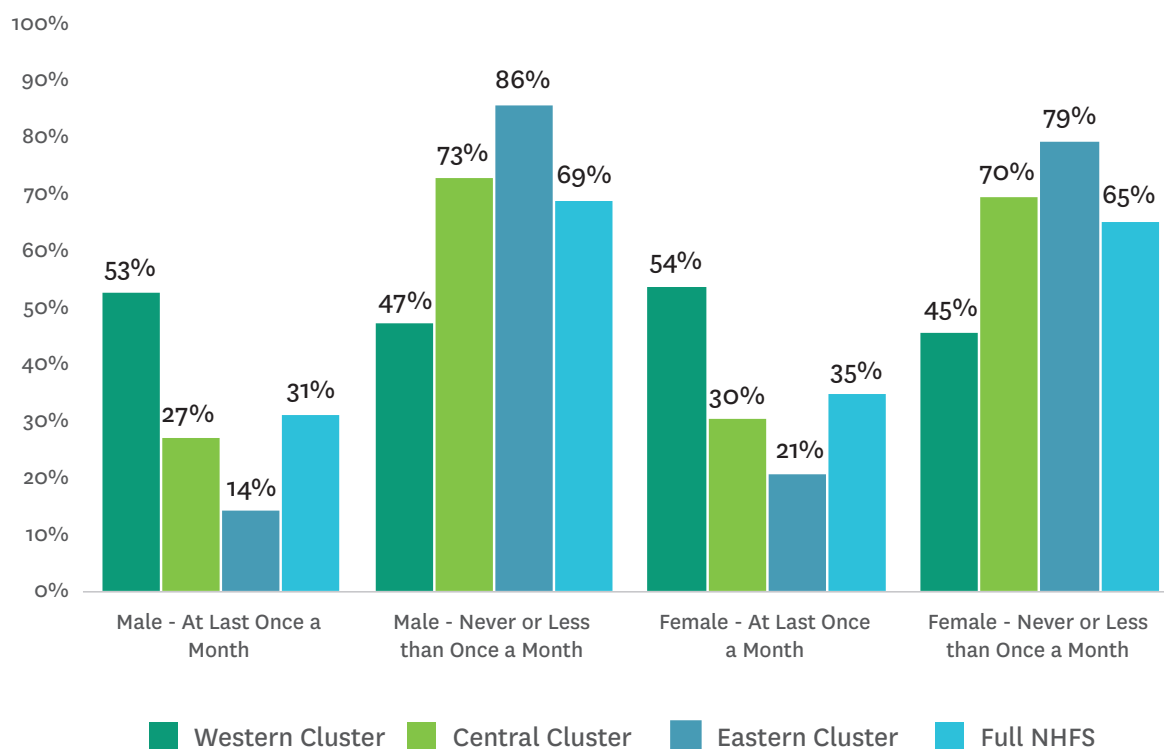
Overall, the majority of communities (both male and female groups) reported that there were either no meetings or meetings less than once per month. This was reported by 69 percent of the male group and 65 percent of the female group.

However, there were several differences in perceptions across the clusters. Both men and women in Western Cluster reported that meetings happened at least once a month (53 percent of men and 54 percent of women). In Eastern Cluster, only 17 percent of men and 21 percent of women reported having meetings at least once a month.

Figure 81 | Male and Female Representation at Community Meetings on Forest Usage According to Male and Female Groups (% of Communities)

Male Representation at Community Meetings on Forest Usage

84%   91%

Female Representation at Community Meetings on Forest Usage

81%   78%

■ Male Group   ■ Female Group
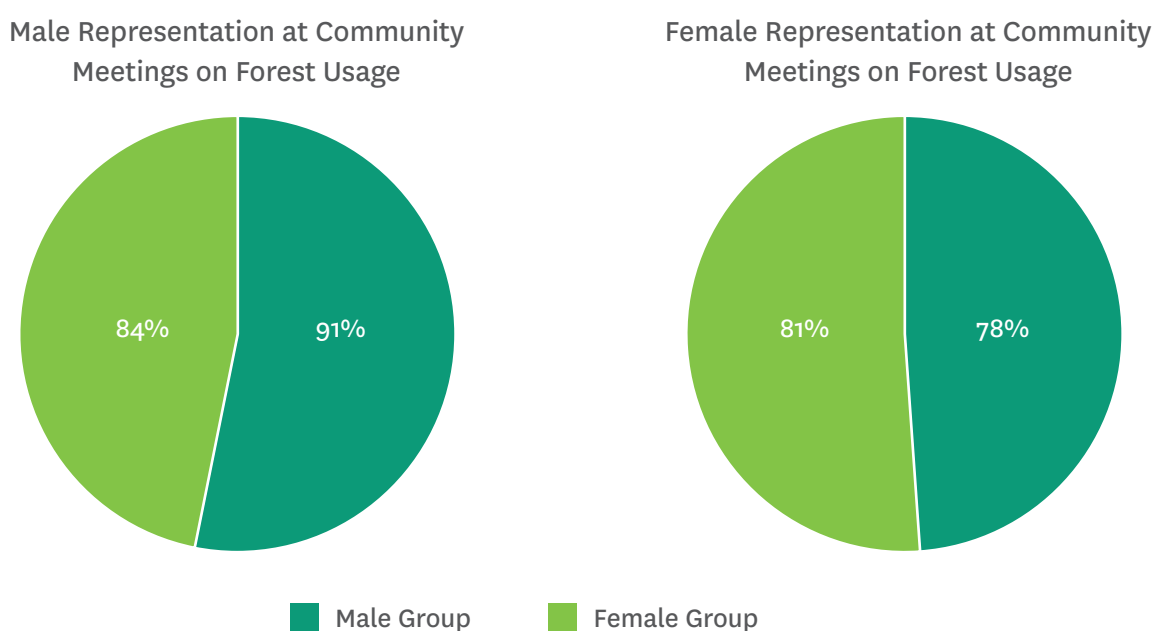
Overall, men and women in all the clusters reported that both genders were fairly well represented in community meetings. However, the male groups reported that men were better represented than women, although not by much. The male group reported that males were represented at 91 percent of community meetings and the female group reported that 80 percent of males were represented. When communities were asked about female representation the numbers were slightly lower. The male group stated that females were represented at 78 percent of meetings while the female group stated that females were represented at 81 percent of meetings which are fairly similar perceptions.

Figure 82

Women are Encouraged to Attend Community Meetings According to Male and Female Groups (% of Communities)

Are Women Encouraged to Attend?
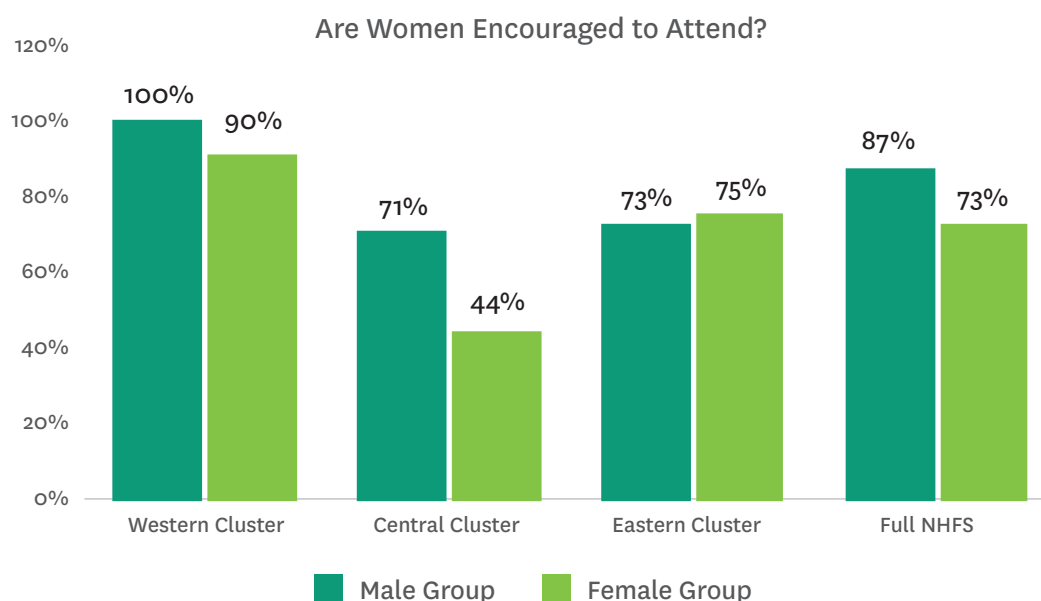
Overall, more men than women reported that females were encouraged to attend meetings. On average, the male groups reported that 87 percent of the communities encouraged female participation and the female groups reported that 73 percent of the communities encouraged women.

Central Cluster stood out as being different from the other groups. The female group in Central Cluster reported that females were encouraged less than men with only 44 percent saying that females were encouraged.

Figure 83 | Percentage of Male and Female Groups Who Agreed Female Participation Should be Increased (% of Communities)

Should Women be Encouraged to Attend?
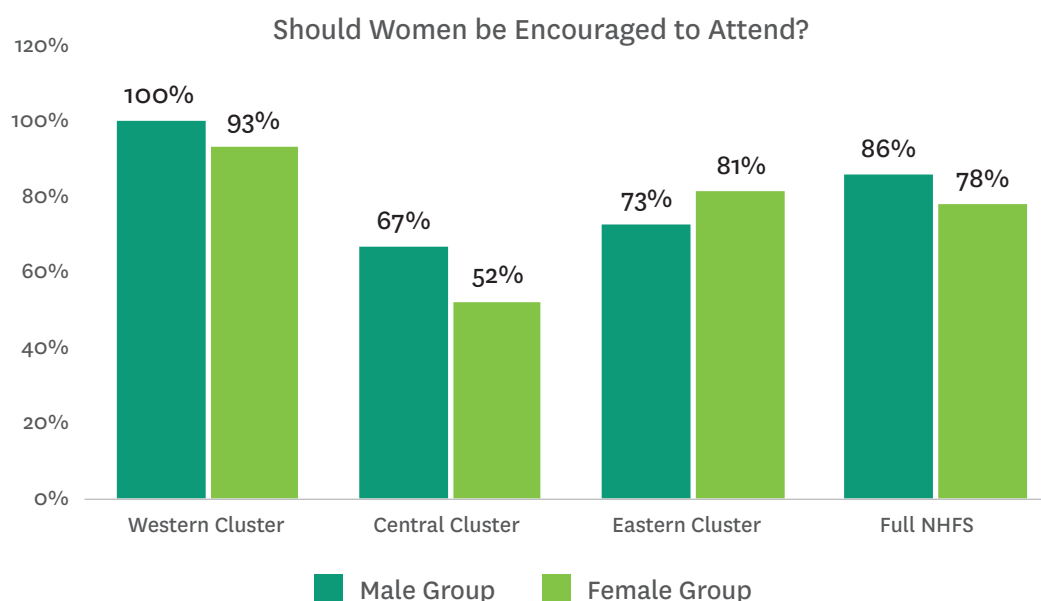
Both groups favored increasing female participation, with 86 percent of men agreeing and 78 percent of women agreeing. Interestingly, men felt more strongly about this than women (86 percent versus 78 percent).

However, again Central Cluster stood out as being different from the other clusters. Overall, they were less supportive of female participation being increased with only 67 percent of men being in favor and only 52 percent of women being supportive.

What Do the Data Tell Us?

Female participation is perceived to be high and women's opinions are given careful consideration and incorporated into decision-making.

Overall, respondents in all three clusters felt that female participation should be encouraged more than it currently is. While Central Cluster was the least enthusiastic about encouraging increased participation of women, both men and women (men more so than women) agreed it was important.

5

CONCLUSIONS AND RECOMMEN-DATIONS

Key Results

- There was a high dependence on forest products both for direct consumption and as a source of income.
- Forests offered important social safety-net functions when households (HHs) experienced natural and economic shocks and crises.
- Forest products were important for HH livelihoods, and much of the collection of forest products was for subsistence needs.
- HHs cleared forest lands to grow crops and plant trees.
- More men than women participated in community level meetings, ran forest-based businesses and benefited from development programs. However, the opinions of women in meetings were considered important by both men and women, and both men and women felt that women should have a greater role.
- Both formal and informal local-level rules influenced how forest products were collected, and while community awareness about these rules varied, there was a consensus that rules were set by community heads.
- Participation rates in sustainable forest management programs was low, as was the receipt of external support such as training, policy information and free inputs.

Opportunities for Change

- Secure alternatives for meeting subsistence needs for food, fuel, shelter and medicines
- Promote income generating activities
- Remove gender biases
- Strengthen the governance of resource collection at local level
- Increase the coverage of sustainable forest management programs
- Improve the collection of data and monitoring of economic progress.

5.1 CONCLUSIONS

The findings of the Liberia National Household Forest Survey (NHFS) confirm the significant dependence of HHs on forest products, mainly for subsistence needs. There were few differences across the clusters, which suggest a lack of regional variations. Forest products contributed an average of 35 percent to the total income of forest-proximate HHs. The survey showed that HHs living close to forests spent significant amounts of time collecting forest products to meet food and shelter needs. HHs collected over 40 products from the forest and can spend over three hours per HH day collecting just five products (fuelwood, bushmeat, timber, fronds and rattan). HHs also cleared significant areas of primary forest to plant food crops, such as rice and cassava.

This dependency on forests and subsistence living is not surprising in the context of the overall socioeconomic situation in Liberia. Both semi-urban and rural populations have higher poverty rates. In addition, there are limited opportunities to generate sustainable sources of income to allow these HHs to exercise other alternatives for meeting basic needs for food, energy, medicine and shelter.

The intensity with which HHs collect forest products depends on many factors. These include poverty rates, forest density, and accessibility to forests. It is also affected by the availability of other opportunities to access sources of food, construction materials, medicines, and whether they have access to markets. Given the overall high levels of poverty (50.9 percent nationwide as of 2016)[55] combined with ease of access to forests and a lack of economic alternatives, HHs are likely to collect larger amounts of forest products to meet their basic needs. This creates a vicious cycle of overextraction, forest degradation, and ultimately a decline in the availability of resources to meet HH needs. In addition, without action, forests in Liberia will continue to be poverty-traps for forest-proximate HHs. Forests will get more degraded and deforested, and the situation for HHs and communities that rely on these forests for survival will deteriorate further.

It is crucial that this unsustainable cycle of HH poverty and the use of forest products is broken. There is a need to place the spotlight on the urgency for a suite of interventions to improve the basic well-being of these HHs and reduce their reliance on forests. There is also an urgent need to focus on food security, shelter, access to medicine, access to infrastructure and livelihoods, to ensure guaranteed income sources throughout the year and increase access to these much-needed products.

This should be complemented with interventions aimed at improving the policy and regulatory frameworks for the management of forest resources in partnership with communities and by enforcing existing laws and regulations. This could encourage extensive investments in income- and employment-generating activities both in forestry and non-forest sectors.

The Liberia Country Forest Note[56] prepared in 2018, identified several sectoral challenges and opportunities to manage the issue of forest-proximate communities and the sustainable management of forests. These included:
- The potential to generate significant local incomes and employment through the processing and marketing of nontimber forest products (NTFPs), timber and charcoal
- The need for training and capacity building of communities
- The need to promote gender equality
- The importance of improving governance, particularly at community level, through appropriate governance structures, and
- The importance of encouraging collaborative sustainable management programs.

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55 https://data.worldbank.org/country/liberia?view=chart. Accessed on July 8, 2020.
56 Hooda et al. 2018

5.2 RECOMMENDATIONS

Through the lens of improving the welfare of poor rural HHs, this survey speaks to many of the above challenges and helps to identify feasible interventions. These six recommendations are based on the main findings from the survey:

1. Secure alternatives for meeting subsistence needs for food, fuel, shelter and medicines
2. Promote income generating activities
3. Remove gender biases
4. Strengthen the governance of resource collection at local level
5. Increase the coverage of sustainable forest management programs
6. Improve the collection of data and monitoring of economic progress.

Recommendation 1: Secure alternatives for meeting subsistence needs, for food, fuel, shelter, medicines

- Almost all HHs depend on fuelwood to meet their rural energy needs, particularly for cooking purposes which is a basic HH need. Therefore, in the short- to medium-term, options to provide HHs with alternate sources of fuel saving and clean cookstoves should be considered.
- There is a high reliance on forests to extract construction material like poles, timber, and fronds. Access to these products could be facilitated by designating some forest management areas as productive forest for community needs allowing communities to plant fast-growing trees to meet their construction needs. Designated productive forests growing bamboo, rattan, and other construction materials could also create an alternative stream of income for HHs, assuming they have access to processing and markets.
- The decline in the availability of medicinal plants could have far-reaching health repercussions for the HHs. Promoting cultivation of key medicinal plants through awareness-building and community initiatives would be good practice. Establishing community-owned enterprises to prepare processed forest products including traditional medicines could give sufficient incentive to HHs to collectively conserve the biodiversity in forest areas and improve productivity of medicinal plants for self-consumption and sale. While ensuring continued availability of traditional medicines, it could also create alternative livelihoods for women, and compensate them for their time and labor.
- Bushmeat is an important consumption item which generates a significant share of HH income. Yet, there are risks involved with bushmeat including the potential for outbreaks of zoonotic diseases such as Ebola. The hunting and sale of bushmeat is illegal in Liberia but proper enforcement is absent and high poverty rates encourage the trade. Breeding fish and poultry, and goat-rearing, could supplement HH's protein requirements. In addition, awareness of the risks of bushmeat consumption needs to be highlighted. Studies are needed on community preferences and what they think would work for them. In addition, options for implementing quality control through the regulation of bushmeat hunting should be considered.
- Most forest clearance is related to agricultural crop production (92 percent of HHs). In response to this, investments in crop intensification and the adoption of climate-smart approaches in agriculture need to be promoted.

Recommendation 2: Promote income generation activities

- The processing and sale of forest products could be an important way to increase rural incomes. However, currently less than a quarter of HHs carry out any amount of processing. The current survey did not collect in-depth data on reasons for why this is so. Although low levels of processing may be due to a number of reasons, some immediate actions focusing on skills enhancement, basic infrastructure, and market access could be a good start.
- Skills development enhances the ability of people to take advantage of income generation activities. Training centers should be established to learn skills related to processing forest products into higher-value commercial products. This could be backed up with financial support to organize communities or cooperatives to reap economies of scale in the production and marketing of these products and to more easily access markets.
- Value addition of forest products is important for sustainable livelihoods and income generation. Transforming these products into viable produce for sale would create more income generating activities. A complementary in-depth analysis should be undertaken to explore the value addition of forest products further. This analysis should also identify the key gaps and how these could be addressed.
- Small-scale gold mining is a highly lucrative source of income across the country. Policy and law makers need to be aware of the importance gold has for these vulnerable communities and develop regulations for gold mining activities, including developing safe extraction practices to protect the health of the miners and the environment and rolling out training on these practices for small-scale miners.

Recommendation 3: Remove gender biases

- Greater participation by women in decision-making regarding forests should be promoted. This should include encouraging women to chair meetings and to voice issues that are of central interest to them. It is also important to understand the barriers to women participating more actively in these meetings.
- Another issue is how the numbers of women entrepreneurs can be increased so that their skills and innovative talents can be harnessed to generate income and bring about greater gender equality and female empowerment. Best practice examples from other countries could be adapted to the Liberian context.

Recommendation 4: Recognize the social safety net function of forests in planning and implementation of strategies to fight economic downturns and other national crises

- In times of crises, the contribution of forests as a source of subsistence needs, especially food is indisputable. This fallback behavior of HHs can lead to over-extraction and unsustainable forest use. Thus, special attention should be paid to expanding the coverage of social protection systems among these extremely poor HHs. In addition, it is important to promote their productive inclusion in available economic activities, to counter the pressures of unsustainable forest use and to preserve the safety net role of forests for future needs.

Recommendation 5: Strengthen the governance of resource collection at local level

- Formal and informal rules relating to the collection of forest products support sustainability and can prevent a situation where individual users fail to work collectively to protect this important resource, that is averting a 'tragedy of the commons'. Since knowledge of these rules varies across products, and regional clusters, it is important to raise awareness across all communities. It should also be ensured that these rules allow for an equitable sharing of benefits among HHs.

Recommendation 6: Increase the coverage of sustainable forest management (SFM) programs

- Programs on SFM are recognized by communities to provide many benefits. However, coverage of these programs is low and declining. There is a need to explore why the coverage of these programs are in decline. In addition, they need to be scaled up to build the long-term skills, competence and overall capacity of communities to manage their forest resources sustainably. Communities in remote locations should be a special focus of these programs and female participation should be encouraged to promote gender-balanced development.
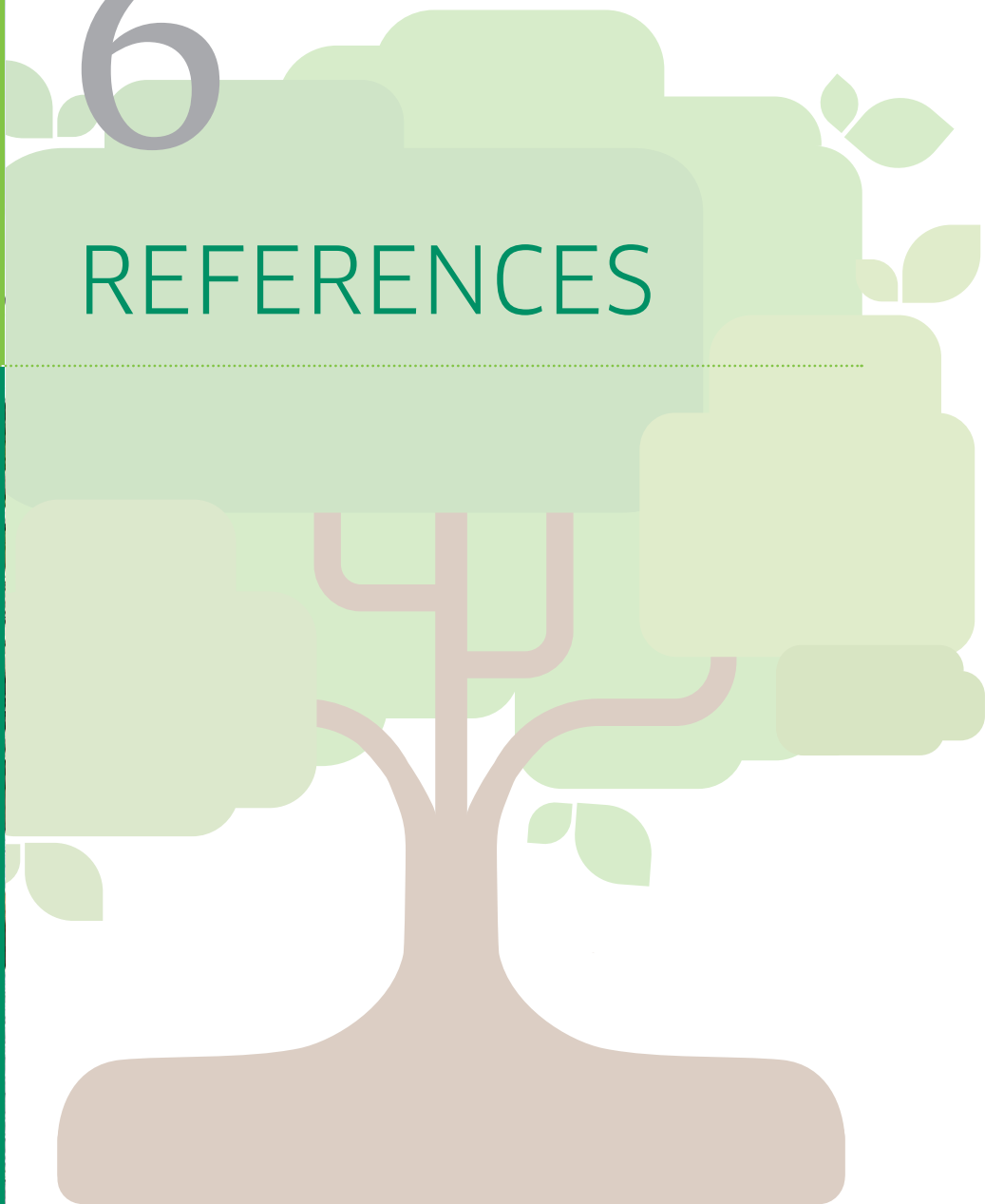
Recommendation 7: Improve the database and monitoring of economic progress

- There is a need to regularly carry out surveys such as the Liberia NHFS. This should happen at least once every three years. This would validate existing information, gather new information and allow the monitoring of the economic progress of rural HHs.

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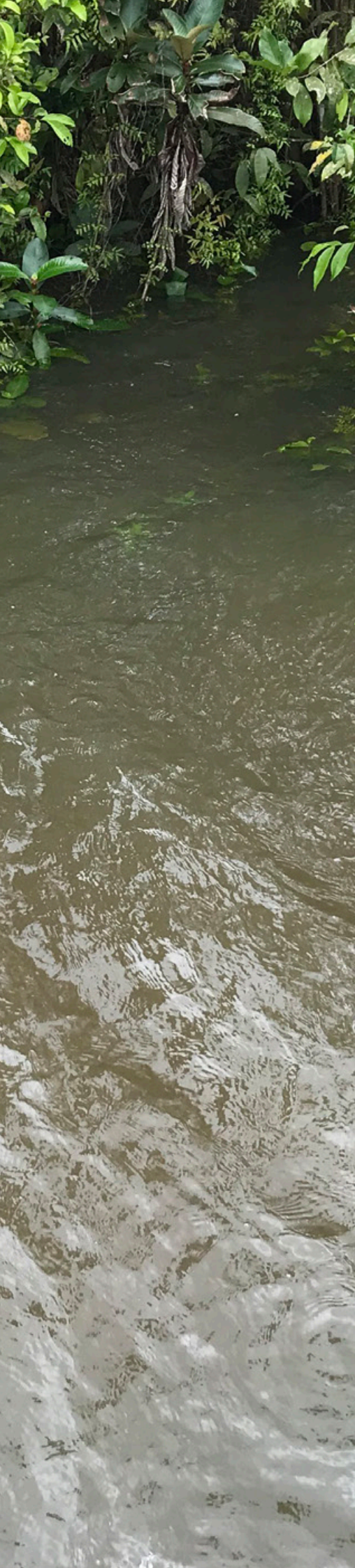
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ANNEXES

ANNEX 1. NHFS SURVEY IMPLEMENTATION

This annex provides supplementary detail on the methods employed in the implementation of the NHFS. For more technical detail on the sample selection, creation of sample weights, and survey instruments, see the Liberia National Household Forest Survey (NHFS) Basic Information Document.

FOREST DEFINITION

The focus of the NHFS was on the population living in close proximity to forests. To identify these populations, it was necessary to approve a definition for a *forest*.

In Liberia, the national definition of a forest is:
1. A minimum area of one-hectare
2. with a minimum canopy cover of 30 percent
3. and minimum tree height at a maturity of 5 meters.[57]

The NHFS used this national definition as a baseline and modified it in order to minimize the impact of small urban forests and facilitate survey operations. The survey focused on the interactions between households (HHs) living close to forests and the forests. The sample was composed of HHs living in enumeration areas (EAs) within 2.5 kilometers of forests with at least 30 percent canopy cover and that are at least 50 hectares in size.[58]

All forest areas were determined using the Metria-Geoville high-resolution forest cover data produced in 2019.[59]

THE SAMPLE

Liberia is divided administratively into 15 counties. Each county is divided into districts, which are further subdivided into clans. For the purposes of statistical surveys, clans are further divided into small operational areas, known as Enumeration Areas (EAs). There are about 7,000 EAs in the country.

On average a rural EA has about 90 HHs. The latest distribution of EAs is available for 2007, corresponding to the latest year in which a census was conducted in Liberia.[60] The forest cover map (adjusted to exclude small forest fragments) was overlaid with EA boundaries from 2007. This resulted in the list of eligible EAs in each of the three clusters of interest.[61] A total of 5,047 EAs were deemed eligible based on the proximity to forest criteria.

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57 Agriculture plantations, including tree crops, such as oil palm, rubber, and cocoa, would not be considered forest under this national definition.

58 Distance from EA to the nearest forest is computed from the centroid of the EA. In addition, any forest patch with a perimeter to area ratio more than 0.02 was excluded. These restrictions were imposed to focus on non-fragmented and relatively large forest areas capable of providing both consumptive and non-consumptive goods and services.

59 Metria and Geoville. 2019

60 LISGIS. 2011

61 The initial sample design included stratification by distance from EA to nearest forest. However, due to errors in the stratification around this variable, identified following the completion of data collection, the sample was re-weighted to reflect the clusters discussed in Section 3. For full details on the sample selection and the subsequent sample weighting, refer to the Liberia NHFS Basic Information Document.

- 250 EAs were selected with probability proportional to size.[62]
- In each of the selected EAs, a HH listing operation was carried out and 12 HHs were randomly selected from each EA listing.
- The final sample consisted of 3,000 HHs across a total of 250 EAs.

The resulting sample consisted of HHs in all 15 counties of Liberia, including the Liberia Forest Sector Project target areas. For more details on the sampling approach, refer to the Liberia NHFS Basic Information Document.[63]

By design, sampled EAs were in close proximity to the forest and the center point of the EAs were within 2.5 kilometers of the nearest forest. See Figure 84 for the distribution of distance from forest to EA center point, and Figure 85 for distribution of distance from forest to HH.

Figure 84 | Proximity of EAs to Forests in the Three Clusters

EA Center Point Forest (km)

Cluster 1 — — — Cluster 2 ········ Cluster 3
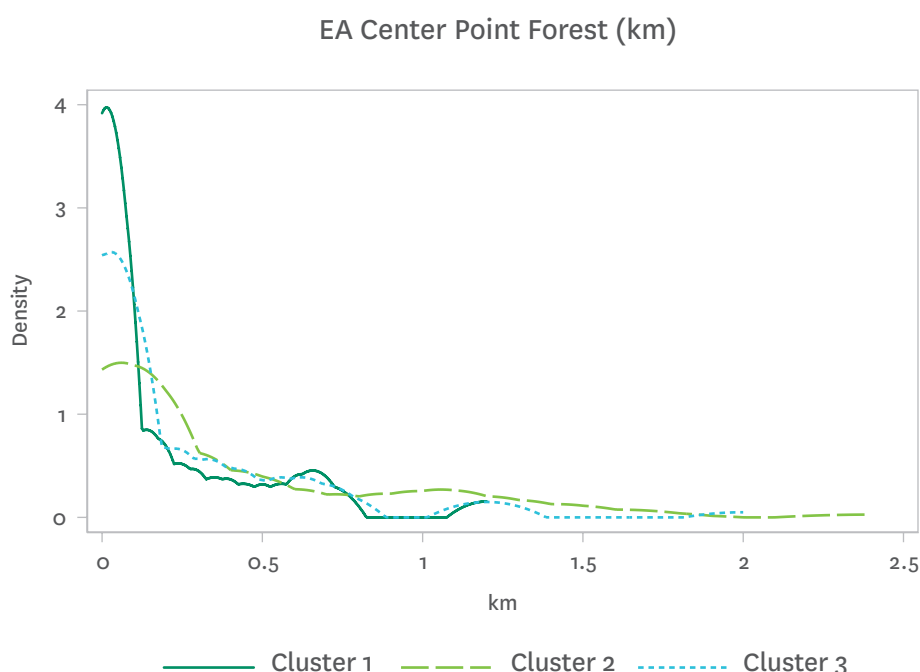
* unweighted
Source: Authors' computation from NHFS data

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62 This is a two-stage sampling approach which ensures that each HH in the population has the same probability of being sampled. This is a widely used approach to sampling. A succinct explanation of the approach, and its application can be found at: http://www.who.int/tb/advisory_bodies/impact_measurement_taskforce/meetings/prevalence_survey/psws_probability_prop_size_bierrenbach.pdf.
63 Reference -TBD

Figure 85 | Proximity of HHs to Forests in the Three Clusters

Household to Forest (km)
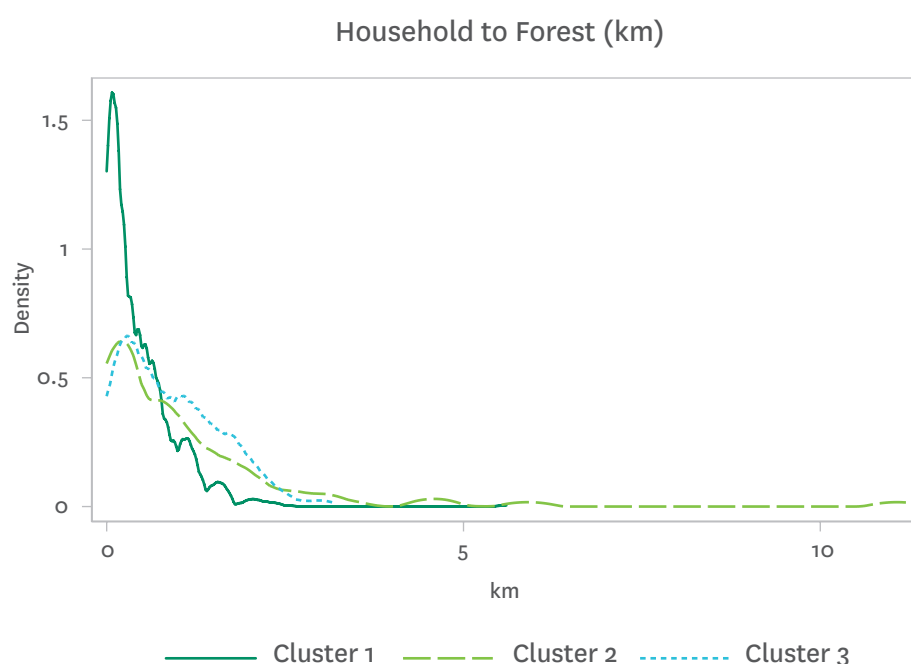
* unweighted
Source: Authors' computation from NHFS data

DATA COLLECTION PROCESS

After intensively training field staff and pilot-testing the questionnaire, the survey was launched in August 2018. Data collection was undertaken at national scale, from 250 Enumeration Areas EAs spread across Liberia's 15 counties. The collection of field data was completed in December 2018. Data were collected via computer assisted personal interviewing (CAPI) on tablets, using CSPro software.

The survey was executed by the Liberia Institute of Statistics and Geo Information Services (LISGIS), under the overall direction of its Director General and the survey management team. This team included staff from the Forestry Development Authority (FDA) of Liberia, Liberia Institute of Statistics and Geo-Information Services (LISGIS), and the Bank's Development Data Group. The management team was responsible for designing the questionnaire, recruiting personnel, training personnel, and implementing the survey.

There were seven teams assigned to the field for data collection. Each team consisted of eight professionals: a field supervisor (team-leader); two mappers and listers; and five enumerators. These teams were supported in their day-to-day operations by several technical staff at the LISGIS headquarters in Monrovia.

For further details please refer to the Liberia NHFS Basic Information Document.

ANNEX 2. CLUSTER DESCRIPTIONS

The cluster-level descriptive statistics below are derived from supplementary data products, not the NHFS directly. Unless otherwise noted, the figures represent only EAs that are represented by the NHFS (that is EAs within 2.5 kilometers of a forest, using the definition defined in Section 3). Some sources of supplementary data, such as for poverty rates, are not available at the EA level and therefore the cluster statistics include all EAs in the given counties, not only those that are within 2.5 kilometers of forests.

THE EXTENT OF FOREST COVER AND ITS QUALITY

Table A9 Area (Hectares) and Percentage of Forest Distribution by Density of Crown Cover

	Crown Density >80%	Crown Density 60-80%	Crown Density 30-60%
Western Cluster	1,350,433 (53%)	120,477 (5%)	257 (0%)
Central Cluster	553, 342 (22%)	124,261 (5%)	148 (0%)
Eastern Cluster	2,086,854 (58%)	13,298 (0%)	0(0%)

Source: Authors' computation using Metri-Geoville Landcover Dataset (2019)

The Eastern Cluster had the largest area under dense forest, over two million hectares. See Table A9. Dense forests (those with crown cover greater than 80 percent) made up 58 percent of the area within the Eastern Cluster. This was followed by 53 percent in the Western Cluster and only 22 percent in the Central Cluster.

VULNERABILITY TO DEFORESTATION AND FOREST DEGRADATION

In Liberia, population density, shifting cultivation, road density, and the presence of forestry, agriculture and mining concessions are often considered to be the drivers of deforestation and forest degradation. The values for these variables (excluding shifting cultivation, for which data is not available) are presented below.

Table A10 Area, Population and Density

	Area (Km²)	Total Population	Population Density per Km²
Western Cluster	25,695	70,627	2.75
Central Cluster	24,806	489,133	19.72
Eastern Cluster	35,888	153,700	4.28

Source: Authors' computation using ArcGIS computation for total area and population counts from Liberia census (2008).

Population density is by far the highest in Central Cluster with nearly half a million people compared to just over 70,000 in the Western Cluster. Population pressure is significantly less in the Western Cluster and Eastern Cluster. See Table A10.

Table A11 | Road Density and Types of Roads

	Major Road Density (Kms per 100 Km2 area)	Length of Major Roads (KM)	Length of Other Roads (KM)
Western Cluster	1.36	350	510
Central Cluster	1.87	464	235
Eastern Cluster	1.89	678	580

Source: Authors' computation using ArcGIS geodatabase LBR_HGIS, received from LISGIS in October 2017.
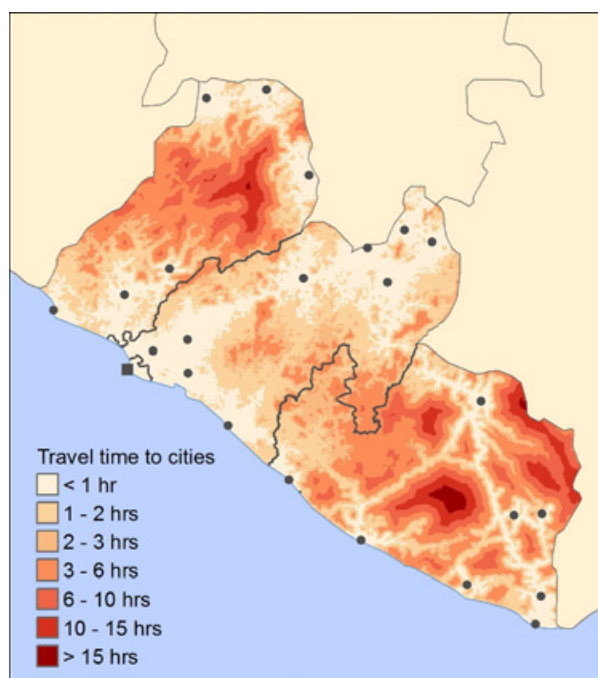
Road density is the lowest in the Western Cluster, which also has the least major roads. The impact of road density on access to Monrovia and other major cities is illustrated in Figure 86 and Figure 87, respectively.

Figure 86 | Travel Time to Monrovia
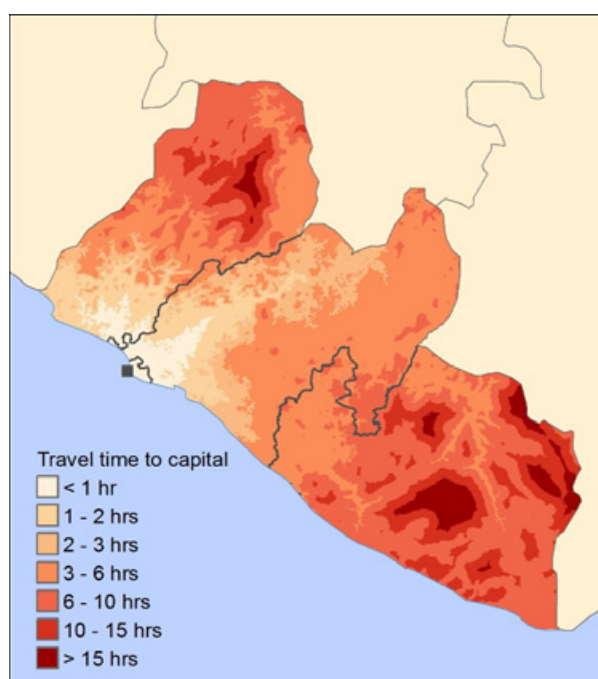
Source: Authors' compilation following methodology of Weiss et al. 2018.

Figure 87 | Travel Time to Cities

Source: Authors' compilation following methodology of Weiss et al. 2018, using 24 urban locations from Liberia Census (2008).

The existence and type of concessions varies across clusters, as seen in Figure 88. Western Cluster has two agricultural concessions, seven forest concessions and 106 mining concessions. Central Cluster has six agricultural concessions, 12 forest concessions and 115 mining concessions. Eastern Cluster has zero agricultural concessions, 27 forest concessions and 68 mining concessions.

Figure 88 | Distribution of Concessions in the Three Clusters
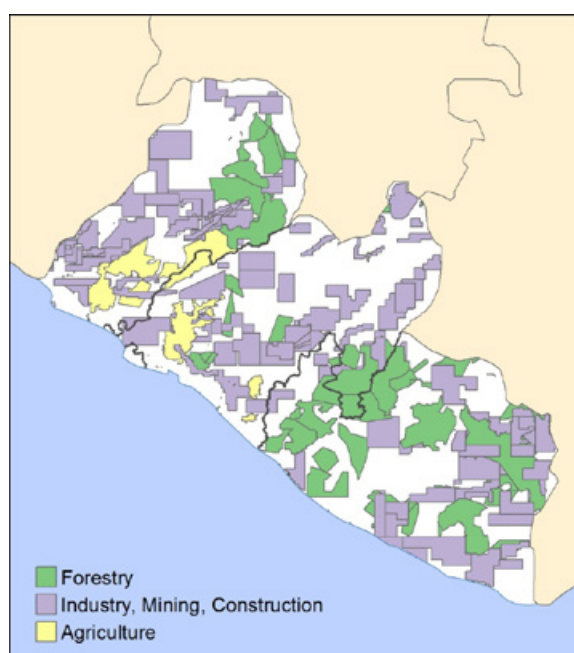
Source: AidData LiberiaConcessions_GeocodedResearchRelease_Level1_v1.0

SOCIOECONOMIC DEVELOPMENT OF THE CLUSTERS

The proportion of population below the poverty line is the highest at 69 percent in Eastern Cluster. It is 63.5 percent in the Western Cluster and 64.5 percent in the Central Cluster. Note that these poverty rates do not exclude EAs more than 2.5 kilometers from forests as that level of data is not available.

Table A12 | Headcount Poverty Percentages (2016)

Western Cluster	63.5
Central Cluster	64.5
Eastern Cluster	69.1

Source: Authors' calculation based on the statistical abstract of the 2016 Liberia HIES. Figures include all EAs in the relevant countries, not only those within 2.5km from forests.

The degree of urbanization, among all EAs (not only those within 2.5 kilometers from forest) is highest in the Eastern Cluster (17.2 percent), with eight major cities, followed by 14.9 percent in the Central Cluster, with nine major cities, and 12.3 percent in Western Cluster with six major cities.

Table A13 | Extent of Urbanization

	Urban Population (%)	Number of cities
Western Cluster	12.3%	6
Central Cluster	14.9%	9
Eastern Cluster	17.2%	8

Source: Authors' calculations, based on 23 cities and towns (excluding Monrovia) from Liberia Census (2008)

ANNEX 3: FOREST PRODUCTS COLLECTED AND PROCESSED

The forest and wild products inquired about in the Liberian NHFS survey are listed below.

Table A14 | Lists of Products Collected

Products Collected			
Wooden Perennials and Wooden-based Products	**Non-wooden Plants and Plant-based Products**	**Animals and Animal-based Products**	**Minerals and Others**
Timber and logs	Bush Cherry	Bush meat – such as mammals, reptiles, and birds	Gold
Poles, fence posts and round poles	Monkey apple	Snails and locusts	Diamonds
Fuelwood and firewood	African walnut	Fish	Other mineral products
Tree barks, leaves and roots	Mushroom	Honey	
Lianas and vines, cover crops and climbers	Roots and tubers	Other animal-based products	
Rattan	Bitter Kola (Garcinia kola)		
Bamboo	Bush Kola (nitida)		
Fronds and thatch	Ganagana		
Piassava	Country Atayee		
Other wood-based products	Reeds		
	Bush Pepper and country spice (xylopia)		
	Bush yam/wild yam		
	Palm cabbage		
	Rubber		
	Makindo palm wild		
	Worlor		
	Palm butter leaf		
	Other non-wood forest products		

Table A15   List of Processed Products

Products Processed	
Wooden-based Products	**Non-wooden Products**
Sawn wood	Woven products and country cloth
Charcoal	Juice and oils from forest products
Furniture and other articles (wood, rattan, bamboo)	Brooms
Other wood-based processed products	Alcoholic beverages: Piassava wine, cane Juice and palm wine
	Pottery and country pots
	Dyes
	Bricks
	Other non-wood based processed products

People and Forests Interface: Contribution of Liberia's Forests to Household Incomes, Subsistence, and Resilience