

The Forests of Liberia: A Pathway to Poverty Alleviation and Food Security

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In Liberia, half of the population lives within 2.5 kms of a forest. Many households rely on these delicate ecosystems to support themselves. A recent study by Dr Festus O Amadu at Florida Gulf Coast University and Dr Daniel Miller at the University of Notre Dame sees sustainable forest management as a positive force in improving livelihoods and environmental outcomes in Liberia. The authors have produced a landmark national analysis of how participation in the 'forest sector' impacts Liberian households – providing policymakers with the evidence they need to prioritise development programmes.

The Importance of the Forests of Liberia

Approximately 69% of Liberian land is covered by forests. Many rural households depend on forests for their livelihoods, utilising timber and non-timber forest products for food, energy, and income. However, the scientific literature (including official statistics) often underestimates the economic importance of forests. Typically, research on the forest economy only represents the formal forestry sector, such as logging. Empirical evidence on the economic benefits of forest product collection and processing (e.g., bush meat, bush yam, or mushrooms) has been notably scarce in West Africa despite it being a widespread activity in the region.

The lead author, Dr Festus Amadu (Florida Gulf Coast University), recognised the pressing need for more comprehensive data on the socioeconomic impacts of forest product collection. He says that while forests could be a vital source of income and well-being for many households, the understanding of how this sector contributes to financial stability and food security remains limited. He set out to investigate the relationship between forest product collection and household income as well as food security in Liberia, aiming to provide valuable insights to inform policy and enhance the livelihoods of rural communities in Liberia with potential applications to similar contexts elsewhere.

Lack of National Scale Analysis

Dr Amadu's research identified a critical gap in existing research on the socioeconomic impacts of forests. He saw that a lack of quantitative analyses on the economic impacts of forest sector participation was hampering development efforts. Whilst the positive impact on households of forest-based incomes has been well documented, most previous studies focused either on specific regions or particular forest products. This left a significant portion of knowledge gaps, especially in underrepresented countries such as those in West Africa. He wanted to produce an in-depth analysis of the factors affecting participation in forest product collection

and processing, as well as how income from these activities varies across the whole country and population. He also wanted to understand how the forestry sector affected household food security among households in rural communities. To undertake this ambitious study, Dr Amadu used data from the Liberia National Household Forest Survey collected by the World Bank, which included responses from 2,983 households living close to forests.

Dr Amadu carried out two sets of analyses using the same dataset: the first output looked at the impacts that forest product collection and processing on household income in Liberia, while the second showcased the effects that the forestry sector has on food security. In the first analysis, Dr Amadu explored four key hypotheses across the two analyses. Firstly, he predicted there would be a large number of variables affecting participation in forest product collection. He wanted to understand better which factors had the most impact on participation. For example, is it age or gender that makes people more likely to participate in the forest economy, or something else like – whether an individual has access to a bank loan? Secondly, he predicted that engaging in forest product collection would be financially beneficial to households, demonstrating its value in poverty alleviation. Thirdly, he expected there to be regional variation in how participation related to income across the country. In the second analysis, he explored the hypothesis that engagement in the forestry sector can enhance food security by reducing the number of months households experience insufficient food.

Choosing the Right Statistics

With access to such rich data, the primary challenge Dr Amadu faced was selecting the right statistical tools to be able to explore these complex questions. Determining the isolated impact of a single factor like age or proximity to a market on a complex socioeconomic behaviour is notoriously challenging. Dr Amadu recognised the need to account for how interrelated



the variables he wanted to explore are. He realised that the decision to participate in forest product activities could be influenced by factors that also affect household income. For example, households with higher incomes might be more able to engage in these activities, which could skew results if not properly accounted for. Therefore, for the first study, he chose to use an advanced statistical method called the endogenous treatment effects regression to draw out causal relationships between variables. Additionally, Dr Amadu recognised the challenges of exploring the spatial impacts of this national data set. The data involved households nested within different counties and regions in Liberia. Households within the same area might share similar characteristics that could influence their income. Therefore, he chose to use a multilevel mixed effects regression, another statistical tool that helps account for these layers of data. This method allowed him to see how the effects of forest product collection and processing on income vary across different counties and regions.

In the second study, he used a count data method – endogenous switching Poisson regression to accurately measure the effects of forestry activities on household welfare through the reported number of months that they had less than adequate food supply. Moreover, he compared the effects that timber and non-timber forest products each had in bringing about the change in household welfare of forest sector participants in the country.

New Insights into the Forest Economy

Dr Amadu's findings provide a wealth of insight into how this vital part of the Liberian economy works and how it can be better harnessed to benefit rural communities and the environment. Most strikingly, his analysis has shown that the collection and processing of forest products increased household income by an impressive 139%. The level of detail provided by his advanced statistical approach enabled him to identify critical factors associated

with the people benefiting from the forest sector. For example, they showed that cultivating crops increased participation in the forest economy by 19%, but female-led households decreased participation by around 5%. Likewise, he showed that the forestry sector improved food security by 84%.

He also showed that non-timber forest products, such as bushmeat and wild fruits, had a higher income impact at 167%, compared to timber at 115%. The effects on food security were also higher for non-timber forest products at 80%, compared to 66% for timber. Importantly, these figures weren't evenly distributed. Households with a higher share of female labour reduced per capita income by 57%, and there were some signs of regional variation across the country.

Dr Amadu's research suggests that effective policies promoting sustainable forest management can lead to significant financial benefits for rural households, and further highlights the challenges faced by women in rural communities.

Creating Real World Value

This is a crucial step towards achieving broader goals of poverty alleviation and sustainable development in Liberia and similar contexts in West Africa. Building on their initial findings, Dr Amadu plans to conduct further research exploring the long-term impacts of forest sector participation on household well-being. He is particularly interested in examining how factors such as climate change and land use changes might affect the sustainability of forest resources and the livelihoods dependent on them.

Additionally, he aims to collaborate with local governments and non-governmental organisations to translate their research findings into actionable policies. By providing policymakers with data-driven insights, he hopes to facilitate the implementation of strategies that promote sustainable forest management while enhancing the socioeconomic conditions of rural communities.



As they move forward, Dr Amadu and his collaborators are committed to advancing the understanding of the critical role that forests play in economic development and environmental sustainability. His work not only provides a foundation for future research but also serves as a reminder of the potential that lies within the natural world to improve the lives of those who depend on it. Through continued exploration and collaboration, he aims to unlock the full potential of Liberia's forests, turning them into a beacon of hope for poverty alleviation, food security, and sustainable development in the region. He also hopes to translate this experience to rural counties that depend on natural resources in Florida and other parts of the US, and thereby contribute to sustainability in those settings.

MEET THE RESEARCHER



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Dr Festus Amadu is an Assistant Professor of Climate Policy at Florida Gulf Coast University, specialising in the use of applied econometrics to address policy-relevant issues like climate-smart agriculture, climate resilience, and sustainability outcomes like forest sector participation and rural livelihoods in developing countries. He earned his PhD in Natural Resources and Environmental Sciences, with a concentration in Environmental Economics from the University of Illinois at Urbana-Champaign in 2018. His research focuses on the impacts of climate policy on household food security and income, as well as the role of green infrastructure in enhancing climate resilience. Dr Amadu has extensive field research experience across sub-Saharan Africa, including countries such as Sierra Leone, Uganda, and Malawi, where he has led several interdisciplinary projects aimed at improving agricultural practices and environmental management.

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FURTHER READING

FO Amadu, DC Miller, [Food security effects of forest sector participation in rural Liberia](#), *Food Security Journal*, 2024, 16, 1099–1124. DOI: <https://doi.org/10.1007/s12571-024-01468-7>

FO Amadu, DC Miller, [Impact of forest product collection and processing on household income in rural Liberia](#), *Forest Policy and Economics*, 2024, 158, 103098. DOI: <https://doi.org/10.1016/j.forpol.2023.103098>



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