

# Sustainable Charcoal and Efficient Cookstoves Technologies for Liberia

**Baseline and Community Assessment Report** 

Date: April 22<sup>nd</sup> 2023







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#### DISCLAIMER:

This report was made possible by the generous support of the German Federal Government and its commitment to strengthening climate and biodiversity action worldwide. The support was provided through the IKI Small Grants program, which is a part of the International Climate Initiative (IKI). The responsibility for the contents of this report lies with VOSIEDA and does not necessarily reflect the views of the IKI Small Grants program or the German Federal Ministry of Economic Affairs and Climate Action (BMWK).

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### **ABBREVIATIONS**

| AFC     | Authorized Forest Community   |
|---------|---|
| BMUV    | German Federal Ministry for the Environment, Nature Conservation,<br>Nuclear Safety and Consumer Protection |
| BMWK    | German Federal Ministry for Economic Affairs and Climate Action   |
| CBD     | Convention on Biological Diversity  |
| CFMA    | Community Forest Management Agreement   |
| CFMB    | Community Forest Management Body  |
| FDA     | Forestry Development Authority of Liberia   |
| FMA     | Forest Management Contract  |
| IKI     | International Climate Initiatives   |
| NDCs    | Nationally Determined Contributions   |
| NCUL    | National Charcoal Union of Liberia  |
| VOSIEDA | Volunteers for Sustainable Development in Africa  |

#### ACKNOWLEDGEMENTS

VOSIEDA commissioned this assessment to review the impact of market-based charcoal production and cooking on open fire on rural communities in Central Liberia. The aim is to provide baseline information for its IKI-funded project: Sustainable Charcoal and Efficient Cookstoves Technologies for Liberia. The information gathered in this report will assist VOSIEDA and others in Liberia in making strategic decisions on how best to support people living in poverty to adapt their livelihoods in a way that makes them more resilient to climate change.

The publication was created by the 'IKI Project Team' who received funding from IKI Small Grant Program. The team appreciates the time and information provided by the interviewees from various communities in Bong County and stakeholders and organization in Monrovia such as the Environmental Protection Agency of Liberia, Forestry Development Authority of Liberia, the Ministry of Agriculture, the Ministry of Land Mines and Energy, among others. All photographs featured in the document were captured by the IKI project team during their field missions.

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For further information on the issues raised in this paper, please visit <a href="https://vosieda.org/">https://vosieda.org/</a> or contact VOSIEDA through the following channels:

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#### International Climate Initiative (IKI)

The German Federal Government is committed to strengthening climate and biodiversity action worldwide. Through its funding program, the International Climate Initiative (IKI), it supports ambitious projects on climate change mitigation, adaptation, as well as forest and biodiversity conservation on an international level. Since 2022, IKI has been implemented by the BMWK, in close cooperation with the BMUV and the AA. The ministries jointly support approaches that implement and develop the Nationally Determined Contributions (NDCs) and adaptation goals anchored in the Paris Agreement ambitiously, including measures to conserve and rebuild natural carbon sinks, taking into account environmental, economic and social concerns.

The IKI also supports its partner countries in achieving the goals of the Convention on Biological Diversity (CBD). The IKI Small Grants Program is part of the IKI and is commissioned by the BMWK and AA (International Climate Intiatives, 2023).

#### EXECUTIVE SUMMARY

#### 1.1. Introduction

Deforestation is a serious issue in Liberia's central region of Bong County due to pervasive market-based charcoal production. The majority of Bong County's population comprises small-scale farmers and charcoal burners. Unfortunately, the prevalent poverty in the region is hindering their welfare and less than 1% have access to modern electricity (Workbank, 2023). The traditional three-stone fires that the families use for cooking consume enormous amounts of firewood, leading to deforestation and land degradation. Additionally, these fires contribute significantly to greenhouse gas emissions. The International Climate Initiatives (IKI) is supporting VOSIEDA under its small grant scheme to address this dire situation. This assessment is commissioned to provide the IKI-funded program with a baseline of essential information for the project team. It will allow them to make well-informed, targeted decisions on how best to support the communities involved in deforestation through market-based charcoal production and firewood gathering. The goal is to develop a sustainable approach that strengthens the beneficiaries' livelihoods to become more resilient to climate change over time.

#### 1.2. Findings

Charcoal is in high demand in all seven communities and Liberia as there are no affordable alternatives available. A significant number of charcoal producers (85%) interviewed exhibited a dismissive attitude towards the impact of their livelihood on the environment. A smaller proportion (15%) acknowledged the possible environmental ramifications, attributing them to the lack of alternative job opportunities provided by the government. The majority (80%) of charcoal producers were skeptical of afforestation efforts, believing that trees were a plentiful resource that would never be depleted within the forest. Community members in all the assessed communities were unaware of the impact of charcoal harvesting on the environment.

Charcoal production is expected to increase in assessed communities and Liberia at large in the coming decades, which is largely informal and generates income for more than 80% of rural people. However, due to the lack of regulation, this sector promotes inefficiency resulting into deforestation and land degradation (World Bank: Liberia Forest Sector Project, 2019).

The prices of charcoal in the communities assessed are low due to various factors. These factors include the availability of raw materials, a large number of part-time producers who have low-income expectations, minimal regulation and taxation, subsidized transportation, and high retail competition. Furthermore, the industry operates outside of the formal sector, making it difficult to obtain official statistics on production, trade, use, and employment. Despite efforts to regulate the industry, low enforcement capacity and the high cost and complexity of compliance pose significant challenges, making such attempts impractical. Due to the ongoing consolidation of the value chain by well-resourced urban traders, prices are likely to remain low in the future.

The challenges posed by charcoal production in Liberia's communities require policy changes, sustainable forest management, private sector involvement, and proactive actions. However, past and present Liberian leaders have failed to address basic amenity and infrastructure issues, putting vulnerable communities at risk. Rampant charcoal production in major forest blocks exacerbates the situation. Poor individuals are the most vulnerable to the environmental hazards that come with production, such as increased temperature, flooding, and degradation.

#### 1. INTRODUCTION



Liberian cooking has been reliant on open wood-fired cooking for a long time. However, cleaner cookstove can potentially decrease carbon emissions and save lives in this West African country.

#### 1.1. Background

Liberia is located on the West African Atlantic coast and experiences diverse climate zones. The equatorial climate in the southern region results in rainfall throughout the year, while the northern area has a tropical climate dominated by the West African Monsoon. During the wet season, coastal Liberia experiences monthly rainfall exceeding 1,000mm, whereas in the dry season, the Harmattan winds from the Sahara Desert blow in, making the region dry and dusty. The country has an estimated population of five million people. It accounts almost 45% of the Upper Guinea forest of West Africa. Unfortunately, about 70% of Liberians still lack access to electricity (International Development Association (IDA), 2021). They primarily rely on biomass, such as charcoal, fuelwood, or crop residues, for heating and cooking.

Liberia's forests make up over two-thirds of the country's land area and cover 6.69 million hectares, twice the size of Belgium, according to the 2018-2019 National Forest Inventory. However, between 1990 and 2010, Liberia lost an average of 30,000 hectares or 0.61% per year, resulting in a total loss of 12.2% of forest cover or around 600,000 hectares. At the current rate, if deforestation persists, Liberia will have no forests left by 2050 (Work Bank, 2020).

The use of traditional three-stone fires for cooking in many households consumes a significant amount of firewood. This practice, along with market-based charcoal burning and wood collection, is leading to deforestation and land degradation. Besides, these open fires are a major contributor to greenhouse gas emissions. In addition to the environmental consequences, there are serious health implications related to inefficient cooking methods through exposure to smoke and the unsafety of the fire. For many families, firewood can also be very costly or timeconsuming, especially for women who are traditionally responsible for collecting it.

In response to the outlined development challenges, the International Climate Initiative (IKI) has approved funding for VOSIEDA under its small grant program to address environmental issues in Central Liberia. The project aims to reduce greenhouse gas (GHG) emissions, combat illegal wood harvesting, and alleviate poverty. VOSIEDA plans to accomplish these objectives by using sustainable energy technologies and services, particularly for low-income households in rural communities. The project will build two charcoal kilns in Bong County, train two charcoal associations on sustainable charcoal production, and provide improved cooking technologies requiring less biomass fuel to 1,000 households (International Climate Initiative, 2023).

To execute the project effectively, it was crucial to fully understand the context in Liberia regarding market-based charcoal production, open-fire cooking, vulnerability, resilience, poverty, and livelihoods. Identifying gaps in existing approaches was possible due to this understanding. Integrating climate adaptation into development interventions should be done with caution, given past experiences with insufficiently addressing environmental issues. Addressing climate change challenges within current poverty alleviation programs, for example, changes in ecosystem services, can present difficulties. Despite these challenges, the project represents an opportunity to holistically address development, disaster, and environmental matters in Central Liberia. This is a promising approach that has been overlooked for years, leading to degradation.

#### 1.2. Assessment Approach

This report provides context-specific information on the production of market-based charcoal and open-fire cooking in Liberia. Its aim is to assist VOSIEDA in slowing deforestation and reducing community vulnerability in Central Liberia. The report acknowledges the importance of community-based adaptation strategies to charcoal production and the long-term livelihood issues related to charcoal and open-fire cooking. By addressing both of these areas, VOSIEDA can support vulnerable people, their communities, and the Liberian government in responding to climate change. The report uses seven communities as case studies to obtain context-specific information, including: (1) Galai, Kpaai District; (2) Flehla, Salala District; (3) Dotin Town, Kpaai District; (4) Kowai Town, Kpaai District; (5) Charlie Too Town, Kpaai District; (6) Duncan Farm, Salala District; and (7) Flehla Town, Salala District.

#### 1.3. Materials Used

A four-wheel-drive vehicle was used to carry out all the visits. A digital camera was used to capture pictures that could provide evidence of the impacts of charcoal production, open fires, and climate change within the communities assessed. An HP laptop computer was used to accurately summarize field notes at the end of daily activities. A GPS was used to take precise time measurements and track locations.

#### 1.3. Methods used in the assessment

We used a semi-structured interview technique and questionnaires to gather information from community and national stakeholders. In total, we conducted 203 interviews and focus group discussions in seven communities in two districts in Bong County, Central Liberia, including Galai, Kpaai District; Flehla, Salala District; Dotin Town, Kpaai District; Charlie Too Town, Kowaii, Kpaai District, and Duncan Farm, Salala District. We spoke with 160 households and investigated various charcoal production sites to understand the impacts of the production and its contribution to climate change as well as current adaptation strategies. Despite some challenges, we completed field investigations within 11 days. We then spent four days consulting with stakeholders and reviewing literatures at institutions including the Environmental Protection Agency, the Forestry Development Authority, the Ministry of Agriculture, and the University of Liberia. Through our investigation, we wanted to identify actors working on charcoal and related issues such as climate change and open-fire cooking, and to determine what methods they are using and what progress has been made.

#### 1.4. Constraints and Limitations of this assessment

All communities identified for the assessment were accessible by vehicle except Kowaii, where the road was swampy and impassable with vehicle. The assessment team had to walk to conduct the assessment. The assessment was limited in scope, covering only seven communities rather than all twelve districts in Bong County. Additionally, the assessment was rapid and had time constraints. The assessment didn't cover all key sectors affected by the charcoal industry and climate change, such as charcoal export, deforestation, and overall impact on livelihood.

Although scientific methods were used to gather required information, the assessment did not use any advanced scientific equipment, such as meteorological or hydrological equipment. All scientific information provided was based on previous works. Consequently, there is uncertainty about any projections regarding the exact magnitude, rate, and regional patterns of charcoal production and climate change in the assessed locations, as well as Liberia.

#### 2. **FINDINGS**

#### 2.1. Charcoal and its Impacts on Important Forest Resources

- 2.1.1. The assessment findings reveal that a significant number of charcoal producers (85%) interviewed have a dismissive attitude towards their livelihood's impact on the environment. A smaller proportion (15%) acknowledge the possible environmental ramifications, attributing it to the government's lack of alternative job opportunities.
- 2.1.2. The assessment shows that the majority (80%) of charcoal producers are skeptical of afforestation efforts, believing that trees are a plentiful resource that would never deplete within the forest. Nevertheless, some individuals (20%) have reconsidered their stance on afforestation after being informed about the assessment process.



Wood fuel plays a substantial role in Liberia's cooking energy composition, predominantly composed of charcoal and firewood. Charcoal is produced by subjecting wood to controlled oxygen, generating a carbon-rich end product. On the other hand, firewood is directly burned to induce energy. Women are actively involved in the collection of both firewood and wood, taking up roles as producers and marketers in the charcoal market of Liberia.

- 2.1.3. The community members in all the assessed communities are unaware of the impact that charcoal harvesting has on the environment. During our visits to five different locations, no one had any knowledge about the environmental impact of charcoal production or the importance of afforestation.
- 2.1.4. According to the local office of the Forestry Development Authority in Bong County, Central Liberia, approximately 60% of the animals within the communities are on the brink of extinction due to the impact of deforestation in Central Liberia.
- 2.1.5. According to households interviewed, trees used to produce iron charcoal is running low in their forests, exacerbating the problem. Furthermore, the surrounding areas of this charcoal production site are no longer suitable for agriculture. According to the producers, they believe the soil is no longer fertile for cultivation.
- 2.1.6. Ninety percent (90%) of people blamed the government for their lack of jobs, which led them to engage in the charcoal business. Unfortunately, none of them were aware that trees are a finite resource that requires replanting.
- 2.1.7. The government's failure in delivering sufficient amenities such as electricity, cooking gas, and kerosene has caused a surge in the usage of charcoal. Due to the inadequate power supply and high prices for gas, people of all income levels have switched to charcoal for cooking. Unfortunately, this has caused an increase in the use of traditional stoves and open fires that release higher smoke levels at homes.
- 2.1.8. The FDA has indicated that insufficient manpower and funding are major contributors to the current state. This lack of resources means that there are no effective policies or controls in place to monitor and regulate activities within the forest reserves of Liberia. As such, people are cutting down trees indiscriminately, including small ones. In all the communities where charcoal production occurs, the majority of mature big trees have been removed, leaving only small trees to grow.

- 2.1.9. In Liberia, the charcoal industry lacks official statistics on its scale, value, and employment. The low transportation fee enforced by the Forestry Development Authority is not enough to encourage appropriate regulation and is also waived for small loads. Efforts to introduce industry regulation face capacity constraints and high compliance costs. However, financially sound alternative models can be developed for effective enforcement and taxation. Additionally, better monitoring systems may help formalize the industry. Although low prices and high efficiency pose challenges to structured production and supply systems, there is some potential for improvement in this area.
- 2.1.10. The charcoal industry is believed to employ almost 90% of people living in the assessed communities on a "full-time equivalent" basis, with many more involved in it due to seasonal or part-time work. Prices of coal in the assessed communities and in Liberia are among the lowest in Africa because of an abundance of raw materials, part-time producers with low-income expectations, minimal regulation and taxation, subsidized transport, high retail competition, and value chain capture by well-resourced traders.

#### 2.2. Vulnerabilities of Open Fire in Communities Assessed



Cooking with open fires and primitive cookstoves can have severe health consequences. In one hour, the smoke produced from cooking on an open fire can equal the amount of smoke from 400 cigarettes. Prolonged exposure to this smoke can cause respiratory infections, eye damage, heart and lung disease, and even lung cancer. Children under five and women in the developing world are particularly at risk, with health problems from smoke inhalation being a significant cause of death.

2.2.1. Ninety-nine (99%) percent households interviewed and visited in the assessed communities cook every meal over an open flame, and many do so indoors. This practice of cooking poses severe risks to the health of communities' members, with women and children often succumbing to the cumulative effects of smoke inhalation. It also consumes immense amounts of time and resources, with families spending considerable sums of money and energy on gathering and purchasing fuel. Furthermore, the continued reliance on wood fuel is leading to rapid deforestation across communities, with trees being harvested and collected at unsustainable rates.

- 2.2.2. Open fire cooking is the primary cause of home fires, injuries, and deaths reported by 80% of communities.
- 2.2.3. According to the assessment, 90% of households we interviewed were unaware that the use of firewood as a primary source of fuel leads to environmental degradation. This over-reliance on solid biomass, such as firewood, results in the depletion of natural resources and worsens climate change.
- 2.2.4. Ninety-nine (99%) percent households interviewed and visited, cooking on open fires or traditional stoves produces a lot of smoke.
- 2.2.5. Ninety-nine percent (99%) of households interviewed admitted that women and children are particularly at risk simply because they are traditionally responsible for preparing most daily meals. Many children end up in healthcare centers because they play near unsafe cooking sites.

#### 3. FACTORS CONTRIBUTING TO CHARCOAL PRODUCTION AND OPEN FIRE COOKING

The demand for charcoal in Liberia is growing rapidly and it supported 28,000 full-time equivalent workers across the nation in 2018, as indicated by a report by the World Bank (Work Bank, 2019). The industry's prevalence is attributed to several factors such as the lack of affordable alternatives, abundant raw materials, minimal regulations and taxes, subsidized transport, and high competition amongst retailers. Nevertheless, implementing more practical enforcement and taxation measures, as well as improved monitoring systems, could stimulate the development of economically competitive alternative models. With a shortage of information regarding the industry's scale, value, and employment, there have been challenges in introducing regulation due to limited capacity, high costs of compliance, and the industry's efficiency at low prices. Nonetheless, it may be viable to establish more organized systems for production and supply.

Key factors contributing to the increase in charcoal production are:

- 1. Poverty
- 2. Lack of basic amenities
- 3. Awareness
- 4. Lack of policies and enforcement

#### 3.1. Poverty

The assessment team observed a significant prevalence of poverty among the evaluated communities, which has resulted in a high production of charcoal. Almost all of the residents, about 95%, rely on costly and hazardous lighting options such as oil, kerosene, and flashlights since they are risky to use and pose explosion risks due to adulteration. Consequently, many resort to charcoal, which is a safer and cost-effective option. However, the extensive use of charcoal has resulted in excessive production, which is causing deforestation, destruction of biodiversity and endangering our forest reserves.

#### 3.2. Lack of basic amenities

Charcoal production, deforestation, and poverty are strongly connected in the communities that we studied. There are clear evidences of charcoal production as a major contributing factor to

deforestation in these communities which results in degraded soil quality, lower agricultural yields, reduced access to water, decreased farming income, and ultimately, malnutrition and poverty. Charcoal production and open-fire cooking are driven by a lack of alternative energy sources, poverty, and cultural factors. In many communities, fuelwood is the primary source of energy used for cooking and heating, and charcoal is a more efficient and affordable fuel substitute.

#### 3.3. Awareness

None of the communities and villages assessed around charcoal production sites have any knowledge about the environmental impact of charcoal production. Among the seven locations visited, no one had any knowledge of the impact. Many blame the government for not providing jobs and resorting to charcoal production instead. When asked about afforestation, nobody had any knowledge, as they believe trees will never finish, and new trees will grow on their own. There were no forest guards or any organizations educating them on why and how to plant trees in all the areas deforested.

#### 3.4. Lack of Policies and Enforcement

According to officials of the Forestry Development Agency of Liberia, poor manpower contributes highly to this situation. Inadequate funding affects logistics, which results in no policies being in place to regulate and monitor activities in our forest reserves. This, in turn, leads people to make use of the forest by cutting down trees without control. Even small trees are being cut down. The local forests visited, where charcoal production is taking place, show that most of the mature big trees are gone and have been replaced by small trees that are growing up.

#### 4. SUMMARY AND CONCLUSION

- 4.1. Charcoal is in high demand in all seven communities and Liberia as there are no affordable alternatives available. Charcoal production is expected to increase in the coming decades, which is largely informal and generates income for more than 80% of rural people in Liberia. However, due to the lack of regulation, this sector promotes inefficiency resulting in the government losing millions in revenue. According to the FAO, greenhouse gas emissions of 1-2.4 Gt CO2e are emitted annually due to unsustainable forest management and inefficient charcoal manufacturing and wood fuel combustion. This represents 2-7% of global anthropogenic emissions. The greening of the charcoal value chain has significant potential for reducing global greenhouse gas emissions. This can be achieved by improving wood sourcing, carbonization, transport, distribution and end-use efficiency.
- 4.2. The prices of charcoal in the communities assessed are low due to various factors. These factors include the availability of raw materials, a large number of part-time producers who have low-income expectations, minimal regulation and taxation, subsidized transportation, and high retail competition. Furthermore, the industry operates outside of the formal sector, making it difficult to obtain official statistics on production, trade, use, and employment. Despite efforts to regulate the industry, low enforcement capacity

and the high cost and complexity of compliance pose significant challenges, making such attempts impractical. Due to the ongoing consolidation of the value chain by wellresourced urban traders, prices are likely to remain low in the future.

4.3. The challenges posed by charcoal production in Liberia's communities require policy changes, sustainable forest management, private sector involvement, and proactive actions. However, past and present Liberian leaders have failed to address basic amenity and infrastructure issues, putting vulnerable communities at risk. Rampant charcoal production in major forest blocks exacerbates the situation. Poor individuals are the most vulnerable to the environmental hazards that come with production, such as increased temperature, flooding, and degradation. Reducing disparities in basic amenities, such as cooking gas, and electricity, is crucial to promoting overall growth and reducing inequality. By increasing access to amenities, vulnerable people will have alternatives and a reason to comply with regulations. It is critical to prioritize education on the dangers of charcoal production to instill awareness in the younger generation

#### 5. **RECOMMENDATIONS**

- 5.1. To effectively reduce greenhouse gas emissions from the charcoal industry, it is necessary to engage charcoal producers, promote afforestation, and educate stakeholders on the benefits of tree planting. Misconceptions about the seemingly endless supply of trees must be corrected, and emphasis must be placed on preserving and managing forest resources. The government should facilitate the process and provide essential infrastructure, while also engaging with relevant stakeholders to develop effective policies. Public sectors, NGOs, global partnerships, academic communities, and research must identify and promote ideal tree species and planting techniques to affected communities. The collective efforts of all stakeholders will greatly contribute to reducing greenhouse emissions in the charcoal industry, and support global climate action.
- 5.2. Communities must be empowered to sustainably manage the sources of charcoal, such as natural forests, planted forests, and community forests.
- 5.3. Switching to alternative energy sources is essential for empowering communities. This includes establishing dedicated energy plantations, utilizing agricultural waste, wood residues, and harvesting wood outside of forests, such as agroforestry.
- 5.4. Empower communities to manage traditional kilns better or switch to improved kilns with higher efficiency, which can lead to higher levels of productivity.
- 5.5. Transportation plays a minor role in total greenhouse gas (GHG) emissions in the charcoal production value chain. To reduce fossil fuel usage, optimizing transportation mode is crucial. This can be achieved by efficiently handling products and reducing the gap between wood sources, carbonization plants, and consumption centers.
- 5.6. Empowering communities to use fuel-efficient stoves for household cooking and heating would make charcoal use more efficient and cut down on greenhouse gas emissions. Studies of literature and created models indicate that switching from traditional stoves

to state-of-the-art stoves can reduce GHG emissions by 63%. Employing more efficient furnaces for small-scale industries can also result in lower emissions (Food and Agriculture of the United Nations, 2017).

- 5.7. Charcoal briquettes made from recycled agricultural and household waste have significant advantages and great potential for large-scale use. However, a comprehensive social awareness campaign is necessary to educate the public. A policy framework should support the production and distribution of charcoal briquettes and promote their adoption and use, essential for a sustainable energy transition. Although cost and performance limitations exist, charcoal briquettes can still be used in large quantities. Thus, highlighting these advantages on a broad scale is vital. Policies must facilitate and encourage the wider adoption of the technology in households, promoting its use and ensuring a sustainable energy transition that benefits everyone.
- 5.8. Using sustainable arrangements to enhance community benefits may come at a higher cost than the current charcoal supply system. Our priority is to identify factors that can make sustainable charcoal a viable alternative that meets the goals of the IKI project. This can be achieved by reducing expenses or increasing the value of the product. We must find ways for sustainable charcoal to compete with mainstream charcoal for the project to succeed. To address the ongoing issue of non-sustainable charcoal production and achieve sustainability, we need to conduct more research and implement alternative strategies such as piloting energy plantation at the household levels.

| Annex I: Mission Itinerary    |  |  |  |
|-------------------------------|--|--|--|
| March 20 <sup>th</sup> , 2023 | Introductory meetings with the local offices of FDA, Ministry of Agriculture, and EPA, as well as with the county inspector and development superintendent in Bong County.   |  |  |
| March 21⁵t 2023               | Visit Charcoal Associations in Kpaai District involving household<br>interviews, focus group discussions, and village meetings in Galai and<br>Dotin Town. Visited the charcoal production site and spoke with the<br>people at the FDA checkpoints. |  |  |
| March 22 <sup>nd</sup> 2023   | Visit Charcoal Associations in Kpaai District involving household interviews, focus group discussions, and village meetings in Kowai and Charlie Too Towns. We visited the charcoal production sites.  |  |  |
| March 23 <sup>rd</sup> 2023   | Visit the Charcoal Association in Salala District which involves<br>conducting household interviews, focus group discussions, and village<br>meetings in Flehla Town and Duncan Farm. We also visited the<br>charcoal production sites.              |  |  |
| March 24 <sup>nd</sup> 2023   | Visit Charcoal Associations in Salala District involving household interviews, focus group discussions, and village meetings in Salala Town. We visited the charcoal production sites.   |  |  |
| March 25 <sup>th</sup> 2023   | Traveled back to Gbarnga and held discussions with two charcoal trading groups in Gbarnga, Bong County.  |  |  |
| March 26 <sup>th</sup> 2025   | Sunday – Drive from Gbarnga to Monrovia and overnight.   |  |  |
| March 27 <sup>th</sup> 2023   | Visit FDA and Ministry of Agriculture offices in Monrovia.   |  |  |
| March 28 <sup>st</sup> 2023   | Visit the EPA offices in Monrovia and the University of Liberia's Department of Forestry in Monrovia.  |  |  |
| March 29 <sup>nd</sup> 2023   | Visit Green Gold Liberia for briquetting in West Monrovia, and also visit<br>the two charcoal trading groups in Paynesville's Red-light Market in<br>Monrovia.   |  |  |
| March 30 <sup>rd</sup> 2023   | Consolidate field notes, prepare a debriefing presentation, and validate it with the IKI project team.   |  |  |
| March 31 <sup>st</sup> 2023   | Presentation of provisional mission findings and recommendations to the VOSIEDA management, and develop a report framework.  |  |  |

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