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Toward the Sustainable Management of the Greater Gola Transboundary Forest Landscape: Mapping Forest Landscape Restoration Opportunities

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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

AFR100	The African Forest Landscape Restoration Initiative
EFA	Environmental Foundation for Africa
EU	European Union
CERSGIS	Center for Remote Sensing and Geographic Information Services
CF	Community Forest
CILSS	Committee for Drought Control in the Sahel
CSSL	Conservation Society of Sierra Leone
FEC	Forest Edge Community
FDA	Forestry Development Authority, Liberia
FPPA	Foya Proposed Protected Area
FLR	Forest Landscape Restoration
IBA	Important Bird and Biodiversity Area
IUCN	International Union for the Conservation of Nature
IWRM	Integrated Water Resources Management
GFNP	Gola Forest National Park
GEF	Global Environmental Facility
GRNP	Gola Rainforest National Park
KHFR	Kambui Hill Forest Reserve
MAF	Ministry of Agriculture and Forestry
MRU	Mano River Union
NPAA	National Protection Area Authority, Sierra Leone
PAs	Protected Areas
SCNL	Society for Conservation of Nature, Liberia
SDG	Sustainable Development Goals
ROAM	Restoration Opportunity Assessment Methodology
RSPB	Royal Society for the Conservation of Birds
TIWS	Tiwai Island Wildlife Sanctuary
USAID	United States Agency for International Development

WA BiCC	West Africa Biodiversity and Climate and Change
WRI	World Resources Institute

1.0 INTRODUCTION AND OVERVIEW

A "Stakeholder Workshop on the Mapping of Forest Landscape Restoration Opporunities in the Gola Transboundary Forest Landscape" was held October 22–23 in Tubmanburg, Liberia and drew 41 participants from both Liberia and Sierra Leone. The workshop's objective was to apply the Restoration Opportunities Assessment Methodology (ROAM) to the subject landscape to define and map restoration potentials across the greeater Gola landscape. During the workshop, stakeholders planned efforts to restore the ecological integrity and functioning of the Greater Gola Transboundary Forest landscape that spans the two countries and enhances the well-being of the forest edge communities therein. The workshop marked the first application of the ROAM on a subnational and subregional level - prior applications have fcused on national level planning. It was intended that the lessons learned from this exercise could be appplied to other transboundary or subnational landscapes.

2.0 FOREST COVER AND LAND USE DYNAMICS

Deforested and degraded forest landscapes result in changes to natural ecosystems and contribute to the decline of the ecosystem processes and functions. The effect of these landscape changes has led to biological diversity loss, disturbance of crucial ecosystem functions and services (e.g., water retention and circulation), and exacerbation of local, regional and global climate change impacts. With the large-scale human modification of natural habitats, it has become evident that intentional approaches for the regeneration of ecosystems and degraded land are required to address and/or mitigate these impacts. Forest restoration is one means to regenerate ecosystems, and forest landscape restoration is an approach that has received growing attention from scientists, conservation organizations, governments and international institutions in recent years to meet this challenge.

West Africa has lost 90% of its Upper Guinean Forests. The remaining 10% of these forests (7.3 million hectares) are in fragmented blocks and patches mainly in Liberia (50%), Côte d'Ivoire (21%), Ghana (17%), Guinea (6%), Sierra Leone (4%), and Togo (2%). The proportion of forest loss over the last 40 years is estimated at 37% (see Figure 1) with almost half of total loss occurring within the last 4 decades.

FIGURE 1: DEFORESTATION OF THE WEST AFRICAN FOREST BETWEEN 1975–2013

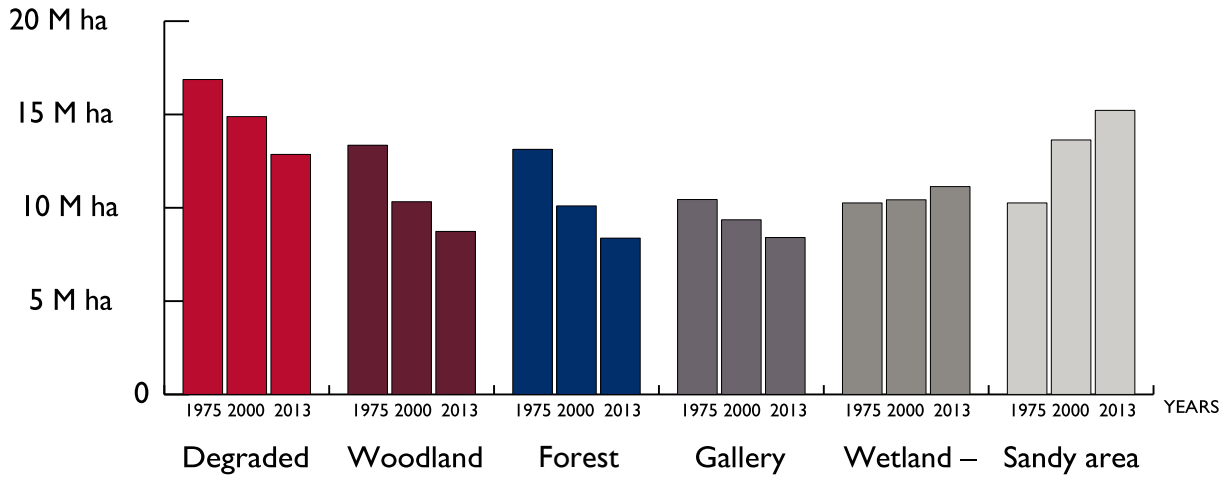


TABLE 1: FOREST COVER LOSS OF WEST AFRICAN COUNTRIES BETWEEN 1975–2013

Country	Deforestation (1975–2013)
Benin	Woodland (70%), Gallery forest (27%)
Burkina Faso	Gallery forest (30%) forest and mainly in PAs
Cote d'Ivoire	Forest (67%) Degraded F (28%) woodland (48%)
Gambia	Gallery forest (42%)
Ghana	Forest (17%) gallery forest (8%)
Guinea	Forest (33%,) Gallery forest (3%), woodland (1%)
Guinea Bissau	Forest (77%)
Liberia	Forest (15%), woodland (98%)
Mali	Gallery forest (23%)

Country	Deforestation (1975–2013)
Niger	Gallery forest (66%), Sahelian short grass savanna 27%
Nigeria	Forest 45%.
Senegal	Woodland (42%), Gallery forest (19%)
Sierra Leone	Forest (30%) Degraded Forest (26%) Gallery forest (22%)
Togo	Forest (21%) Gallery forest (36%)

2.1 CONTRIBUTIONS TO BONN CHALLENGE AND AFR 100

The Bonn Challenge is a global effort to bring 150 million hectares of the world's deforested and degraded land into restoration by 2020, a goal later increased to 350 million hectares by 2030. The Bonn Challenge was launched in 2011 jointly by the Government of Germany and the International Union for the Conservation of Nature (IUCN), and later endorsed and extended by the New York Declaration on Forests at the 2014 United Nations Climate Summit. Fundamental to the Bonn Challenge is FLR, which aims to restore ecological integrity at the same time as improving human well-being through multifunctional landscapes.

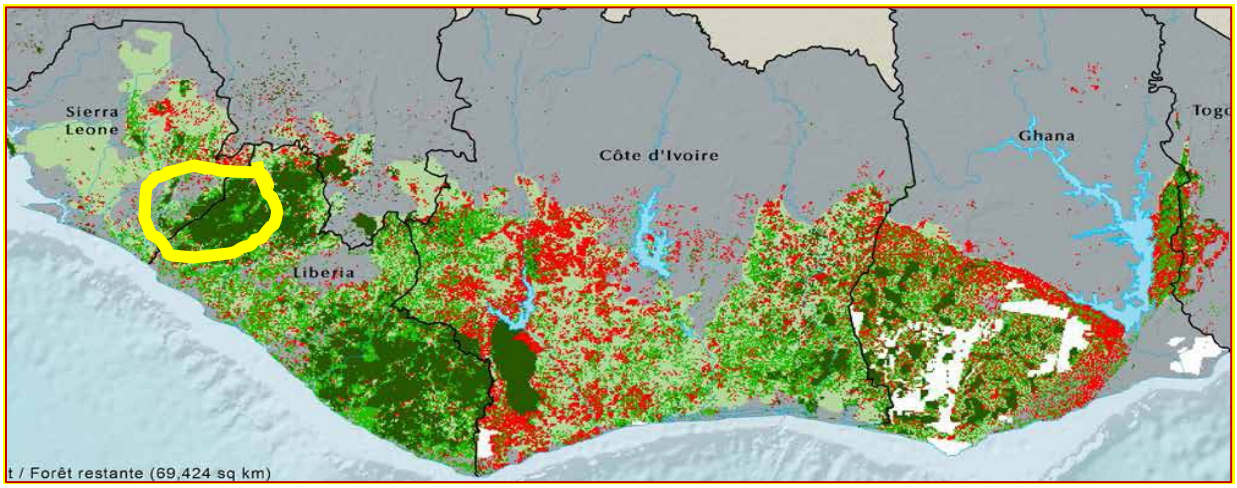
The African Forest Landscape Restoration Initiative (AFR100) is an African led effort to restore 100 million hectares of deforested and degraded landscapes across Africa by 2030 and is designed restore African forest landscapes to enhance food security, increase climate change resilience and mitigation, and combat rural poverty. It is also designed to contribute to the achievement of domestic restoration efforts and development goals (e.g., Sustainable Development Goals - SDGs), along with global treaty commitments (e.g., the Bonn Challenge, New York Declaration on Forests, Sustainable Development Goals and the Paris climate agreement).

Apart from the identification of about 2 billion hectares of FLR opportunities on a global scale (Minnemeyer *et al.* 2011), countries in West Africa have made specific pledges. Notable restoration pledges to date include: 5 million hectares in Cote d'Ivoire; 2 million hectares in Ghana, 2 million hectares; 2 million hectares in Guinea; 1 million hectares in Liberia; 3.2 million hectares in Niger; and 10,000 hectares in Sierra Leone.

3.0 DEFORESTATION TRENDS IN THE GOLA TRANSBOUNDARY FOREST LANDSCAPE

Sierra Leone and Liberia are among the countries lowest on the Human Development Index, ranked 181 and 177 respectively out of 188 (UNDP, 2015). Forest edge communities (FEC) living in the Greater Gola Landscape are among the most disenfranchised, poor and vulnerable in their respective countries. Remote from towns and other infrastructure, they are highly dependent on natural resources for their livelihoods, with no or very restricted access to education, health, agricultural support services, and international aid. For example, Gola forest communities in both countries rely on subsistence agriculture for 90% of their livelihoods. Income levels are particularly low, which is an additional driver for community members to engage in unsustainable activities such as shifting cultivation agricultural practices, conversion of forest for commercial crops like oil palm, rubber and cocoa, charcoal production, and small-scale timber harvesting. Illegal activities such as artisanal mining (gold and diamonds) and commercial bushmeat hunting add to threats. The on-going threats are the major causes of deforestation and forest degradation not just in Gola but across West Africa (see Figure 2).

FIGURE 2: MAP SHOWING THE DEFORESTATION BETWEEN 1975 AND 2013 (RED) IN WEST AFRICA AND REMAINING FOREST (GREEN) WITH THE GREATER GOLA FOREST (WITHIN YELLOW CIRCLE)



(CILLS, 2016)

Sierra Leone. According to the Sierra Leone National Protected Areas Authority (NPAA), drastic changes have occurred in the forest cover during the last century. Approximately 70% of the country was formerly covered by forest, but less than 5% of original intact forest remains. Decrease in forest cover is a result of multiple factors including shifting cultivation, firewood collection, charcoal making, illegal logging, mining, infrastructure development and bush fire. Most deforestation occurred during the last 40 years. In fact, between 1975 and 2000, Sierra Leone's annual deforestation rate was about 0.8% (~110,000 hectares), a rate that decreased after the civil war to 0.4% (Committee for Drought Control in the Sahel [CILSS], 2016).

Liberia. Liberia is the most forested country in West Africa with significant reservoirs of biodiversity. However drivers of deforestation, forest degradation and biodiversity loss are numerous and include forest conversion to commercial plantations (cocoa, oil palm, and rubber), poorly regulated and illegal diamond and gold mining with zero site rehabilitation, hunting of endangered species for bushmeat, trafficking of animals and/or their parts, unsustainable and/or Illegal logging including pit sawing, charcoal production and unsustainable extraction of non-timber forest products.

In 2013, forest covered two-thirds of Liberia's land surface, of which less than 44 % was mapped as degraded forest, followed by agriculture (13%) and savanna (11%) and smaller land cover classes included thicket (3%), gallery forest (2%) and plantations (1.5%). The remaining land cover classes each occupy less than 1% of Liberia's land surface. The overall rate of change in land use and land cover has accelerated from 0.5 % per year between 1975 and 2000—slightly below the regional average—to 1.3% per year between 2000 and 2013, which is above the regional average for the period. While the civil wars (1989–1996 and 1999–2003) slowed down development and land use change, the post-conflict years have seen a surge in land cover transformation. The most important trajectories of land use and land cover change have been associated with loss of forest cover: 300,000 hectares of forest were lost between 1975 and 2000, and another 350,000 hectares between 2000 and 2013 (CILSS, 2016). Deforestation patterns in the Gola landscape are similar in both Sierra Leone and Liberia (see Figure 3).

FIGURE 3: PHOTOS SHOWING SHIFTING CULTIVATION AGRICULTURE (TOP LEFT AND RIGHT), ARTISANAL MINING (BOTTOM LEFT), HUNTING (CENTER) AND CHARCOAL PRODUCTION (BOTTOM RIGHT) IN SIERRA LEONE GREATER GOLA LANDSCAPE

4.0 THE ROAM METHODOLOGY

To help global, regional and national-level policy makers determine how to best meet their targets, a framework methodological tool was developed by IUCN and World Resources Institute (WRI) to guide national-level assessments of restoration opportunities. The tool is called the Restoration Opportunities Assessment Methodology (ROAM) and it provides a flexible and affordable framework for countries to rapidly identify and analyze areas that are primed for forest landscape restoration (FLR) and to identify specific priority areas at a national or sub-national level. Robust application of the ROAM approach includes economic calculations for evaluating different restoration options, and structured guidelines for the whole assessment procedure including the engagement of national and local stakeholders (IUCN and WRI 2014). A link to ROAM methodologies is here.

The ROAM approach aligns with the ECOWAS Forest Convergence Plan developed in 2013 for the Sustainable Management and Utilization of Forest Ecosystems in West Africa. The Plan embodies the ECOWAS strategic vision for the sound management of natural resources, environmental preservation, and sustainable development. The third priority area of the convergence plan focuses on forest ecosystem management and reforestation in which forest landscape restoration plays a significant role. ROAM can also contribute to the targets laid out in the MRU's revised Strategic Plan 2020-2025.

The countries of Liberia and Sierra Leone have made ambitious commitments of 1 million hectares each to the Bonn Challenge and the Africa Forest Restoration 100 initiative for the restoration of degraded forest and their countries. An objective of the Gola Transboundary Forest Landscape ROAM workshop was to support the two countries to identify and map potential priority sites for restoration. The use of ROAM in this landscape will help determine the overall incremental contribution that each restoration option can contribute not just to the Bonn and AFR challenges, but to each country's respective land management and conservation goals. Of note, this was the first application of the ROAM on a transboundary landscape level and provides a case study for similar application in West Africa and beyond.

5.0 ADVANCING SOLUTIONS: TRAINING WORKSHOP TO IDENTIFY FOREST LANDSCAPE RESTORATION OPPORTUNITIES IN THE GREATER GOLA LANDSCAPE

A ROAM workshop was planned as a complement to the MRU/IUCN/GEF ROAM activity, which is part of the broader Integrated Water Resources Management (IWRM) project. This project focused on specific watersheds in each country but did not consider the overall transboundary landscape and the diverse ecosystem demand and functions beyond the watershed scale.

The objective of the ROAM assessment was to support the development of a restoration program and strategy for the Gola Transboundary Forest Landscape and produce a restoration opportunity map to serve as a planning tool for the two countries, both separately and together, to make informed land use decisions on issues such as the placement of biodiversity corridors for the Gola National Parks in both countries, strengthening connectivity with the adjacent Foya landscape, contribute to climate change mitigation and adaptation commitments to the UNFCCC under their Nationally Determined Contributions, prioritize watershed restoration areas and provide information to inform other land use decisions. The specific objectives were to:

1. Support the Governments of Liberia and Sierra Leone and their local communities to determine forest restoration potentials in the Gola Transboundary Forest and adjacent Foya Landscapes by applying ROAM as a planning tool.
2. Mobilize experts to support the development of Forest Landscape Restoration (FLR) opportunity maps for the landscapes.
3. Generate a list of potential priority restoration options and sites, and estimate the climate, community, watershed, livelihood, biodiversity and other environmental benefits.
4. Map potential biodiversity corridors within the Gola – Foya landscape
5. Generate a transboundary ROAM application case study that can be used in other landscapes.

5.1 MAPPING RESTORATION POTENTIALS IN GREATER GOLA LANDSCAPES

Although the Greater Gola landscape is noted mostly for the two major Protected Areas (PAs), it is also a landscape dotted with other land uses including forest concessions, farmlands, community forests, and mining areas. All land uses, when not properly planned, have been contributing to deforestation and forest degradation. Even though the two major PAs are serving the conservation purpose they were intended to in the landscape, there is still evidence of agricultural encroachment and illegal logging and mining taking place within the formal PAs.

It was important to first assess the areas where degradation has occurred or is occurring before investing in efforts to restore forest cover or ecosystem functionality. The workshop team was limited by COVID constraints and did not have enough time or interaction with experts to carry out a broad spatial assessment of the biophysical condition of the two PAs therefore a combination of remote sensing technology, specialist expertise and local in-depth knowledge of communities living in the landscape was used a proxy.

The mapping exercise was accomplished through a participatory approach for transboundary landscape mapping, with stakeholders using satellite imagery of forest cover, and experts consulting with local communities to validate spatial assessments. The merger of 'best of science' (GIS data) with the 'best of local knowledge' (multi-stakeholder workshops and community consultations) constituted the overall strategy. National expertise for the assessment was provided by, among others, the Mano River Union (MRU) Secretariat, the Liberia Forestry Development Authority (FDA), the NPAA, NGO partners, community representatives and other stakeholders. The assessment complemented an earlier assessment of FLR opportunities carried out by the MRU/IUCN/GEF project.

The assessment was designed to ascertain the most promising opportunities to restore the ecosystem functions of the landscape and to highlight the interventions that hold out the most promise in terms of the total additional benefits in terms of biodiversity conservation and livelihoods improvement.

The participants delineated and characterized areas on the landscape maps in terms of restoration needs and described each identified area in terms of possible and recommended restoration interventions. The workshop employed similar processes as those used by the MRU/GEF/IUCN ROAM exercise and involved the participation of similar key stakeholders - national government technical staffs including various District Forestry Managers, Environmental Protection Agencies, representatives of civil society groups and the private sector. While the process was similar, the October 2020 workshop assessed restoration potential across the entire transboundary forest landscape scale as opposed to a nationally prescribed watershed scale. As such it served as a pilot for a subnational/subregional restoration approach while complimenting the MRU/GEF outcomes.

Two teams were constituted during the workshop (see Figure 4), one for Gola/Liberia and one for Gola/Sierra Leone. The groups were provided with respective landscape forest cover maps then guided through the processes of mapping out areas that provide potential restoration opportunities. The landscape teams then mapped out areas where restoration cannot take place, such as cities, roads, etc. This was followed by mapping out areas for wide scale restoration like forest reserves and national parks, followed by the mapping of forest mosaic areas comprised of all other land uses including agricultural lands. With the assistance of a checklist of restoration types, the teams delineated those types that would be feasible in the wide-scale and mosaic restoration land areas.

FIGURE 4: THE GREATER GOLA TRANSBOUNDARY FOREST LANDSCAPE RESTORATION WORKSHOP IN LIBERIA WITH ACTORS FROM SIERRA LEONE/NPAA, MRU SECRETARIAT, AND LIBERIA/FDA AND USAID

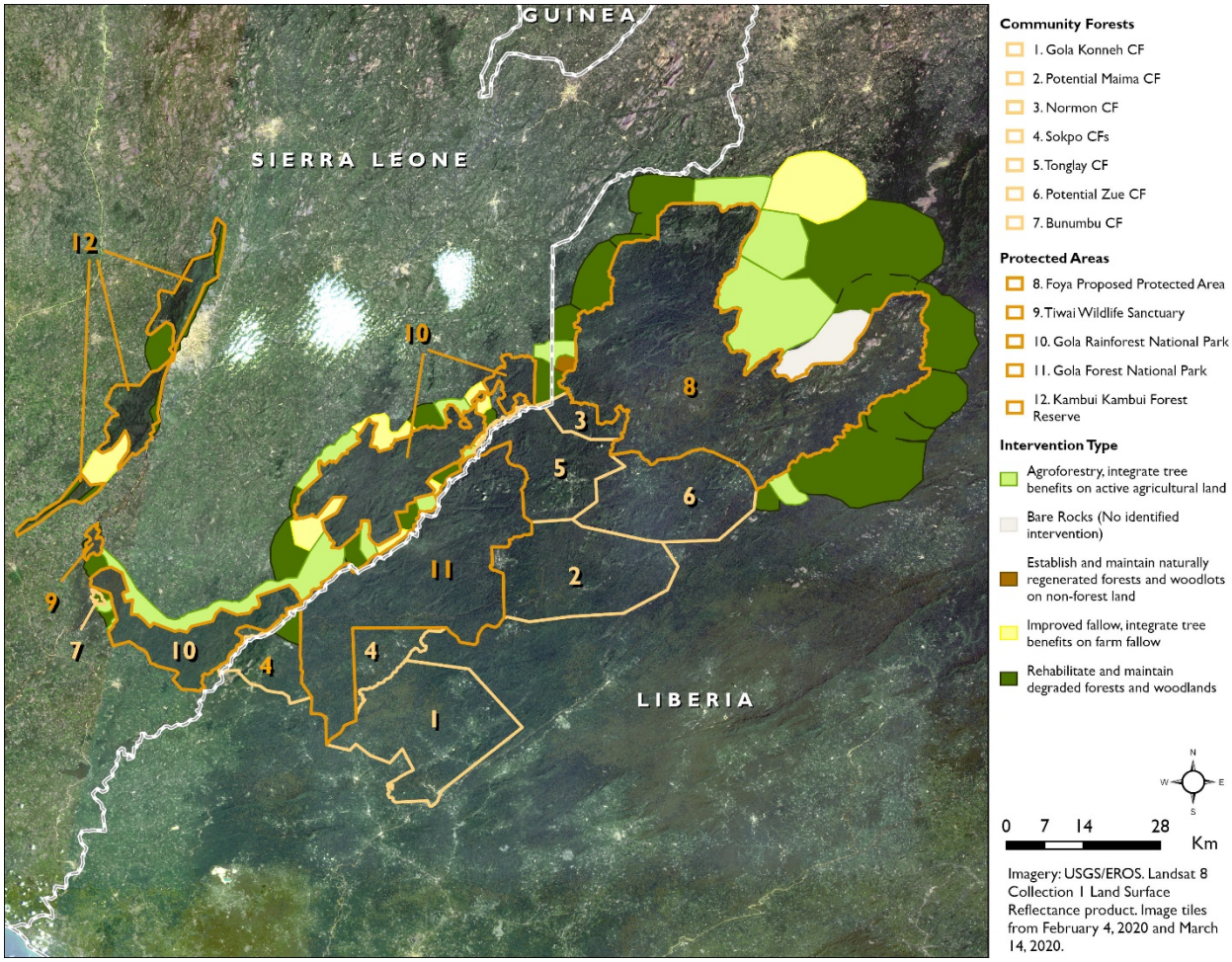
5.2 GEOSPATIAL ANALYSIS

The initial forest cover maps for the Greater Gola landscapes were produced by the WA BiCC GIS Specialist. A further fine tuning was carried out by a GIS expert from the WA BiCC Home Office. The maps produced through the two activities mentioned above were used as the base map for the workshop. The participants at the workshop initially assessed the restoration opportunities by delineating and defining polygons on areas that they felt were degraded based on their knowledge of the areas in both the Liberia and Sierra Leone part of the landscape. Two GIS experts from Liberia followed up by digitizing the polygons for inclusion in a data sets to generate a restoration opportunity map.

5.3 DETERMINING GOLA RESTORATION OPTIONS

The participants made an initial determination of restoration options by creating a short-list of the most applicable and practicable restoration options in the landscape, resulting in the restoration options shown in the map below (see Figure 5). Additionally, the stakeholders suggested management practices that could be carried out to improve existing land uses. A draft look-up table was presented and debated during the workshop and used as the basis for determining the restoration options applicable to the Greater Gola landscape.

FIGURE 5: THE GREATER GOLA TRANSBOUNDARY FOREST LANDSCAPE SHOWING RESTORATION OPTIONS FROM THE FLR WORKSHOP OF OCTOBER 2020



Restoration opportunities were identified for: i) agroforestry - integrating tree benefits on active agricultural land (68,800 hectares), ii) establishment and maintenance of naturally regenerated forests and woodlots on non-forest lands (2,257 hectares), iii) rehabilitation and maintenance of degraded forests and woodlands (148,205 hectares), iv) and improvements to fallow land through integration of tree benefits on farm fallows (31,326 hectares). These four options were the most important ones identified through the workshop and have high restoration potential. The option for the rehabilitation and maintenance of degraded forests and woodlands showed the highest potential with over 148,000 hectares available, followed by agroforestry.

6.0 AVAILABLE AREAS FOR FOREST LANDSCAPE RESTORATION

From the land-use and forest cover maps, a total of 260,290 hectares of land area with restoration potential were identified within the Greater Gola Transboundary Forest Landscape (see Table 2) with the Liberian area of the adjacent Foya landscape representing the highest number of hectares (175,736 hectares) available for the different restoration options. This is followed by Gola South landscape with 28,831 hectares, Gola Central (25,404 hectares) and Gola North 2(12,345 hectares. Gola North and Tiwai Island had the lowest restoration potential of 6,608 hectares and 1,656 hectares respectively.

Table 2: Potential areas for restoration across the landscape

Sub-Landscape	Total Area for Restoration (ha)	Restoration Options
Foya	175,736	Agroforestry, establish and maintain naturally regenerated forests and woodlots on non-forest land, rehabilitate and maintain degraded forests and woodlands, and improve fallow - integrate trees on farm fallows
Gola South	28,831	Agroforestry and rehabilitate and maintain degraded forests and woodlands
Gola Central	25,405	Agroforestry, rehabilitate and maintain degraded forests and woodlands, and improve fallow - integrate tree benefits on farm fallows
Gola North 2	12,345	Agroforestry, rehabilitate and maintain degraded forests and woodlands
Gola North 1	6,608	Agroforestry and rehabilitate and maintain degraded forests and woodlands
Tiwai Island	1,656	Rehabilitate and maintain degraded forests and woodlands, and improved fallow - integrate tree benefits on farm fallows
Total Greater Gola Area	260,290	As listed above

7.0 OPPORTUNITIES AND CONSTRAINTS

7.1 VIABILITY AND PROFITABILITY OF SELECTED RESTORATION OPTIONS

The Greater Gola forest landscape includes five PAs or proposed PAs and seven community forests in various stages of development. Although these PAs are recognized for the functions they perform, they are also influenced and affected by the communities living in and around them. The closer to the PAs the more urgent the need for restoration to reduce the potential for further incursion into the PAs. The value of restoration therefore depends on the level of degradation in the landscape, which will also determine the restoration method with the greater likelihood for success.

Of the four main restoration options identified (i.e. agroforestry; establishment and maintenance of naturally regenerated forests and woodlots on non-forest land; rehabilitation and maintenance of degraded forests and woodlands or improved fallow through integrated tree benefits on farm fallows) participants agreed that land use options combining PA maintenance and management with sustainable resources use were preferred. The agroforestry option is likely preferred in the communities where farmers are active in corridor areas around the PAs. The benefits from agroforestry systems include yields from food crops and cash crop mainly cocoa, timber, fuel wood, and carbon. Food crop and cocoa benefits are received yearly, while fuelwood benefits are only received after several years of the restoration activity. The establishment and maintenance of naturally regenerated forests and woodlots, and rehabilitating and maintaining degraded forests and woodlands, fit into what can be done to best foster biodiversity conservation and landscape linkages.

8.0 CONCLUSIONS AND RECOMMENDATIONS

This exercise complemented the efforts undertaken by the MRU/IUCN/GEF project, which also utilized ROAM as a means of determining restoration opportunities for specific watersheds in the transboundary landscapes but limited to national level assessments due to the parameters of GEF funding. The subject ROAM exercise was able to expand the analysis to the broader transboundary landscape context, the first time the methodology has been employed on this sub-regional and sub-national scale. The COVID-19 pandemic delayed the execution of the workshop and limited the number of participants able to join from Sierra Leone. Major findings and recommendations are summarized below:

- Although a total area of more than 260,000 hectares was identified for targeted forest landscape restoration efforts in Greater Gola with the highest identified for the adjacent Foya landscape, further analysis is needed to determine the specific actions needed to achieve successful restoration interventions.
- The four priority restoration options identified are viable and feasible; however, this was an initial yet important snapshot. Additional analysis should be undertaken for agroforestry since it has the greatest prospect of acceptance by local communities and the private sector because of its ability to generate additional benefits in terms of livelihoods, biodiversity conservations, and climate change adaptation and mitigation.
- The assessment provided an opportunity to promote transboundary collaboration in terms of exchange of ideas and joint implementation of forest management and conservation of biodiversity.
- Private sectors entities, especially those interested in natural resources commodities using an agroforestry approach, should be actively engaged. The involvement of the private sector is paramount in the restoration processes and should be enhanced.
- MRU is committed to support the Member States in the attainment of their Bonn Challenge and AFR100 targets. The result of the assessment will be useful to support MRU and MRU nations to further related policy objectives.
- Due to the limitations of time and COVD restrictions impacting the number of participants, it will be important to carry out a thorough ROAM assessment that will include a cost-benefit analysis of the various restoration options.
- It would be useful to further investigate the synergies between the MRU/GEF/IUCN ROAM applications and the subject exercise to add a level of robustness and avoiding any duplication or confusion for policy makers or practitioners.
- Various actors including policy makers, practitioners, commodity producers and traders, communities and development partners need to collaboratively work together to improve conditions for fast-tracking the extensive adoption of restoration practices and interventions.
- Where PAs have been encroached upon to overcome socio-economic and ecological obstacles and need to be actively or passively restored to the former forest land condition prior to conversion for, agroforestry is the best option to be used in the early stages of restoration s it offers a perfect means to deliver a balance between human and environmental needs.

Finally, it is advised that if FLR interventions are intended to bring back a suite of forest functions, then significant resources must be dedicated to communicating the benefits of these approaches and involving communities, government, civil society and the private sector in planning processes.

ANNEX 1: GREATER GOLA TRANSBOUNDARY LANDSCAPE PROFILES

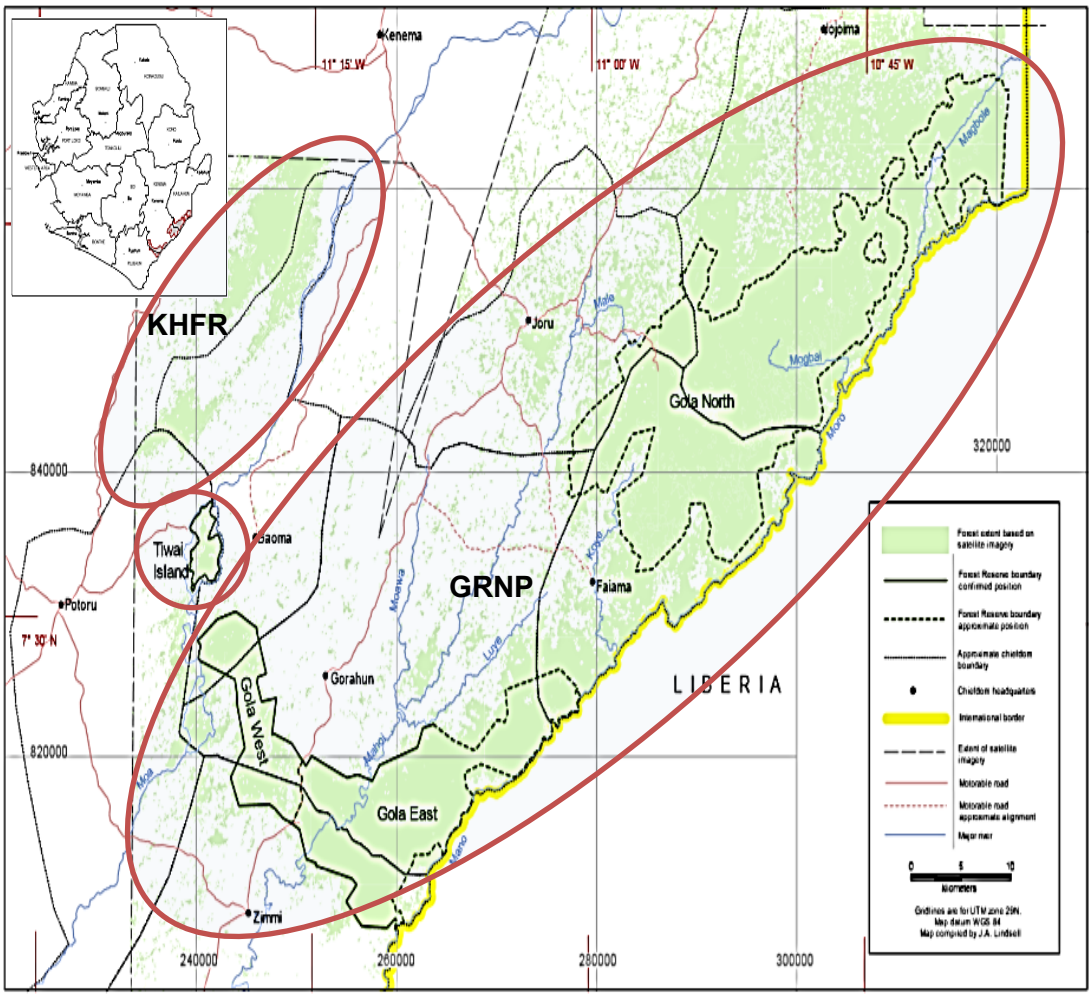
The Greater Gola Transboundary Forest Landscape ranges across the Sierra Leone - Liberia border and represents the second largest remaining block of Upper Guinea Forest, covering over 350,000 hectares.

The descriptions below identify species listed on the IUCN Red List of Threatened and Endangered Species and the following key is used to identify these: CR=Critically endangered; EN=Endangered; VU=Vulnerable; NT=Near Threatened; LC=Least Concern.

The Sierra Leone Greater Gola Forest

The Sierra Leone Greater Gola forest (see Figure A1) comprises community forestry lands and several PAs: the Tiwai Island Wildlife Sanctuary (TIWS - 16,157 hectares), the Kambui Hills Forest Reserve (KHFR - 21,228 hectares) and the Gola Rainforest National Park (GRNP - 71,070 hectares).

FIGURE A1: MAP SHOWING THE SIERRA LEONE GREATER GOLA FOREST WITH THREE PROTECTED AREAS



The Kambui Hills Forest Reserve. The 21,228 hectares Kambui Hills Forest Reserve (KHFR) in the eastern province of Sierra Leone was established in 1920 and is contiguous with Tiwai Island Sanctuary to the south. It is an Important Bird and Biodiversity Area (IBA) and it home to over 200 species of birds, including five that are of global conservation concern including the emblematic White-necked Picathartes. The following primates are found at the site: Western Chimpanzee, Western Red Colobus, King Colobus, Sooty Mangabey and Diana Monkey. Other threatened mammals include the African Forest Elephant and Jentink's Duiker, Black Duiker and Maxwell's Duiker. The Reserve also provides critical ecosystem services, in particular water, as it serves as a catchment area for a few reservoirs that supply Kenema city and surrounding communities.

The Tiwai Island Wildlife Sanctuary. This PA (16,157 hectares) is the longest running community led conservation initiative in Sierra Leone. Established in the 1970s, it is proximal to the western edge of Gola West, which is characterized by gentle slopes generally below 5°. After the the Sierra Leone Civil War (1991-2001) Tiwai Island received initial core funding for conservation and research from donors, including the Critical Ecosystem Partnership Fund (CEPF) that funded the rebuilding of the visitor centre in 2006. This supported helped catalyse the arrival of 400-600 visitors per year and generated close to three hundred million Leones (3 million USD) distributed to the eight neighbouring communities over the last 14 years.

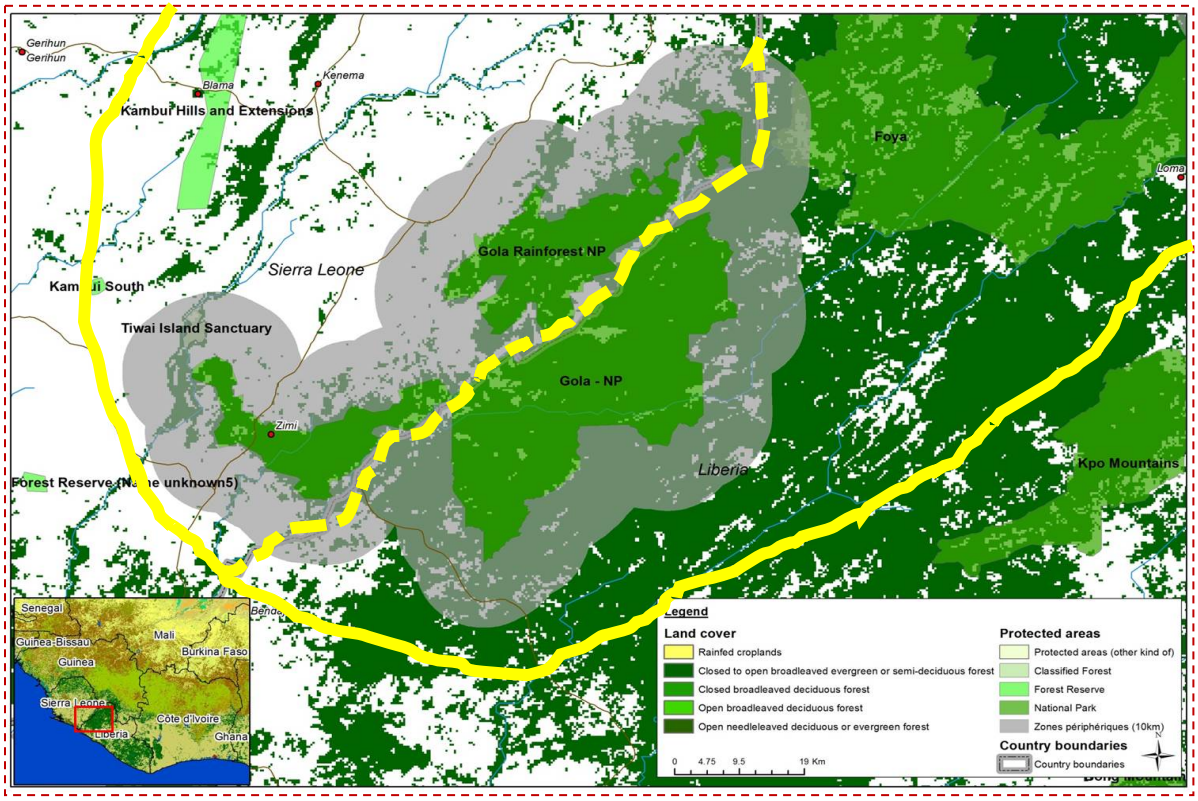
The nature of the vegetation on Tiwai Island is a microcosm the Gola landscape. Historically it is assumed that vegetation cover was closed evergreen forest human activities, mainly farming, have resulted in modifications and at present there is a mixture of vegetation types. There are over 700 plant species on the island, mainly trees. The dominant forest type is tropical evergreen forest, with characteristic species including *Heritiera utilis, Brachystegia leonensis, Calpocalyx aubrevillei* and *Sacoglottis gabonensis*. Along the edges of the island where the vegetation is riparian forest, *Uapacca guinensis* and *Protomegabaria stapfiana* are common. Moist semi-deciduous forest also occurs in places and is dominated by species such as *Cynometra leonensis, Parinari excelsa, Parkia bicolor* and *Piptadeniastrum africanum*. There are patches of freshwater swamp forest with Raphia palm present and characteristic tree species are *Uapaca* spp, *Nauclea diderrichii* and *Newtonia duparquetiana*. Areas that have experienced some farming and logging and have been left to regrow and the dominant tree species in these secondary forests are *Carapa procera, Macaranga barteri* and *Musanga cecropioides*.

Tiwai Island is home to 11 primate species, one of the highest densities of anywhere in Africa. Primates include Western Chimpanzee *Pan troglodytes verus* (CR), Diana Monkey *Cercopithecus diana* (EN), Red Colobus Monkey *Procolobus badius* (VU), Sooty Mangabey *Cercocebus atys* (VU) Black-and-White Colobus Monkey *Colobus polykomus* (NT), Campbell's Monkey *Cercopithecus campbelli* (LC), Mona Monkey *Cercopithecus mona* (LC), Callithrix Monkey *Cercopithecus sabaeus* (LC), Olive Colubus Monkey *Procolobus verus* (LC), Lesser Spot-nosed Monkey *Cercopithecus petaurista*.

The Gola Rainforest National Park. Conservation efforts in the GRNP since the late 2000s funded by the European Union, USAID and others helped launched the long-term conservation and climate change mitigation through national and international partnerships for improved forest governance along the Sierra Leone – Liberia border. Through this stewardship, the Gola Rainforest National Park (88,000 ha) was established in 2011. Over the years, information generated demonstrated that the Greater Gola transboundary forest is of a global conservation importance. It is home to over 60 threatened or endangered species, over 899 vascular plants, including 232 trees (at least 21 threatened), 49 Mammals (9 threatened) including a population of 300+ chimpanzees, pygmy hippopotamuses, a much reduced forest elephant population, 327 bird species, over 650 species of butterfly and 43 amphibians. The

Greater Gola Forest Landscape plays a critical function through the range of ecosystem services it provides and contributes to the mitigation of climate change impacts both globally and locally through the uptake and storage of carbon.

FIGURE A2: MAP SHOWING THE SIERRA LEONE AND LIBERIA GREATER GOLA FOREST WITH PROTECTED AREAS & FOYA



It is made of the community forestry lands and protected/proposed PAs covering the Gola Forest National Park (GFNP - 88,000 ha) and the proposed Foya Nature Reserve (FNR -164,628 ha).

The Gola Forest National Park. Studies have registered dominant tropical evergreen forest tree species including *Heritiera utilis, Brachystegia leonensis, Calpocalyx aubrevillei* and *Sacoglottis gabonensis*. Common in the wet areas of this forest are *Uapaca guineensis* and *Protomegabaria stapfiana*. Examples of dominant species in the moist semi-deciduous lower forest areas are *Cynometra leonensis, Parinari excelsa*, *Parkia bicolor* and *Piptadeniastrum africanum*. Steep rocky slopes are populated by *Erythrophleum ivorense* and *Nesogordonia papaverifera*. The third main natural forest is the freshwater inland swamp forest. This forest type predominates on poorly drained soils of inland valleys and seasonally flooded forest along rivers, in both evergreen and semi-deciduous forest. Raphia palms may be dominant, and characteristic tree species include Uapaca spp., Nauclea diderrichii and Newtonia duparquetiana. Where and when activities such as farming and logging occurred in any of the main forest types, pioneering species such as Carapa procera, Macaranga barteri and Musanga cecropioides also thrive. Other plants species endemic to Liberia include *Cephaelis micheliae*, *Trichoscypha linderi* and *Sericanthe adamii*. A large liana, *Zanthoxylum psammophilum*, not previously recorded west of eastern Côte d'Ivoire, constituted a new record for Liberia. A Rhaphiostylis species likely to be new to science was also discovered (Conservation International, 2007). The forest is home to 14 amphibians and 4 reptiles (Hillers *et al.* 2013), 41bats (3

endemic to the Park) (Weber & Fahr 2011, Monadjem & Fahr 2007), 216 birds (GFNP-MP-2019 2012, Fishpool & Evans 2001, Statterfield *et al* 1998),700 butterflies (Safian et al 2015, Safian & Collins 2015, Hillers et al 2013, Safian 2011), 90 damselflies and dragonflies (Dijkra 2013),20 small and 109 large mammals (Safian 2001, Monadjem 2011) and 9 key landscape species (Hillers *et al.* 2013).

The Proposed Foya Nature Reserve. The Foya proposed PAs (FPPA 164,628 ha) is one of more than 11 National Forests earmarked in the 1950s for conservation. It is part of the Gola-Mano complex, the extension of the remaining forest block of the Gola Rainforest National Park (GRFNP) in Sierra Leone and the Gola Forest National Park covering Grand Cape Mount County in the west, Gbarpolu County in the middle and stretching toward Lofa County to the North East. It was long ignored by conservationist probably due to its poor road network, but with Liberia's development it has increasingly been considered by FDA and partners to be gazetted as a PA. Its biodiversity value and socio-economic context were recently uncovered (SCNL 2019).

Mammals – Foya PPA is home to the Western Chimpanzee (*Pan Troglodytes verus* CR); the Pygmy Hippopotamus (*Choeropsis liberiensis* EN), Jentink's Duiker (*Cephalophus jentinki* EN); Forest Elephant (*Loxodonta cyclotis* VU) and Long tailed Pangolin (*Phataginus tetradactyla* VU) were among some of the mammal species identified.

Birds – Foya is home to a total of 184 species of birds and amongst the species recorded one, the Gola Malimbe-*Malimbus ballmanni* is endangered (EN), six are vulnerable (VU) Yellow Casqued Hornbill-*Ceratogymna elata*, Yellow Bearded *GreenbulCriniger olivaceus*, White Breasted Guineafowl-*Agelastes meleagrides*, Browned Cheeked Hornbill-*Bycanistes cylindricus*, *Psittacus erithacus* African Grey Parrot, Green-tailed Bristlebill *Bleda eximius* and five near threatened (NT) Crowned Eagle-*Stephanoaetus coronatus*, Green tailed *Bristlebill- Bleda eximius*, Copper-tailed Glossy Starling-*Lamprotornis cupreocauda*, Rufous winged *Illadopsis- Illadopsis rufescens*, Wooly Necked Stork-Ciconia episcopus and one is data deficient (DD), Sharpe's Apalis sharpie. In addition, five bird species are near endemic to the Upper Guinea forest block: Yellow-casqued Hornbill (*Ceratogymna elata)*, Fire-bellied Woodpecker (*Dendropicos pyrrhogaster)*, Kemp's Longbill (*Macrosphenus kempi)*, Buff-throated Sunbird (*Chalcomitra adelberti)* and Red-vented Malimbe (*Malimbus scutatus*).

Amphibians – A total of 40 amphibian species (all anurans, or frogs), most being forest dwellers and less than a quarter known for open habitats. Twenty-six species are only known from the Upper Guinea forests, half of them even only from the western part of this biodiversity 23 hotspot. Most of the recorded species are dependent on rainforest habitat and have restricted ranges within West Africa. Only one species is listed by IUCN as being Vulnerable (*Conraua alleni*), one Endangered (*Amnirana occidentalis*), and 5 are listed as Near Threatened while majority are Least Concern. The threat status of most of the species is not assessed.

Butterflies – A total 285 species are recorded (after just 10 days of surveys) including the recently described *Iridana kollariki* (Sáfián, 2014) and *Geritola pacifica* (Sáfián & Libert, 2015). Both were collected in the nearby Gola National Forest during the baseline surveys for the Across the River Programme and *G. pacifica* is still known to occur only in Liberia, specifically in Foya Proposed PA (FPPA), Sapo National Park and the Wologizi Mountains (Sáfián 2012, Sáfián & Collins 2014, Sáfián, Collins & Libert 2015). Other species of conservation importance identified were *Neurellipes gola Libert*, 2010 and *Pseudopontia gola (*Sáfián Mitter, 2011), which indicate close affinities of Foya Forest to the adjacent Gola Forest National Park. The IUCN red-listed *Papilio antimachus* was seen in a single specimen. Further, Liberian sub-region endemics were represented in samples including *Bicyclus dekeyseri, Euriphene leonis* and

Scopulifera sagamase tropeki. The latter was recently described in Liberia from specimens captured on hilltops (Sáfián 2014).

Moths – A few hundred moth species are recorded in FPPA including common Lasiocampidae and Erebidae and rare *Sphingidae* and *Saturniidae*. A single specimen of a large *Episannina* is recorded along with two potential new species included *Thintiinae* and *Episannina species*. Other species like *Thysanoplusia diastalagma* and *T. hemichalcea* are new to records for Liberia and *T. diastalagma* is new to West African records.

Plants – A total of 313 plant species are recorded and 20% of them are endemic to the Upper Guinea Forest. The species are partly a mixture of evergreen forest species (e.g., *Androsiphonia adenostegia*, *Ptychopetalum anceps* and *Sabicea ferruginea*) and, more often, semideciduous forest species (e.g., *Chidlowia sanguinea*, *Cola reticulata, Octoknema borealis* and *Xylia evansii*) but there are also species that occur in all kinds of forests (e.g., *Landolphia dulcis* and *Manotes expansa).* The presence in northwest Foya Forest of both species of tree fern known in Liberia (*Alsophila camerooniana* and *Cyathea manniana*) shows that a part of the forest is wet all year round. More than 90% of the plants on the list are only found in the Guineo-Congolian forests defined as from Senegal to the west of Uganda and from the south of Central African Republic to the north of Angola.

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