

EVALUATING INVESTMENT AND FINANCIAL FLOWS OF FORESTRY SECTOR ISSUES IN CLIMATE CHANGE MITIGATION IN LIBERIA



Author: Samuel N. Koffa, Consultant, Monrovia, Liberia

August 2010

Contents

Forestry as a key sector of the economy.....	3
Description of the forestry sector	11
Proposed mitigation measures for the forestry sector	15
Key issues in assessing investment and financial flows	20
Recommendations for conducting the assessment of investment and financial flows.....	26
References	32

Forestry as a key sector of the economy

Global attention to climate change has heightened awareness of human impacts on the environment. Progressing more slowly in this respect is recognition of the crucial inter-relatedness of forests, human welfare and climate change. Forests are a key component of environmental resources as they provide a rich assortment of products such as timber and ecosystem services that include the sheltering of agricultural crops against drought, sustaining watersheds, maintaining water purification, protecting humankind against nuisances (fumes, noises, smells, storms), flood regulation, recreational opportunities, spiritual and cultural fulfillment and more importantly, climate change, as both a cause and a solution.¹

As forests are intricately linked to climate change², concerns are raised because the current levels and methods of extraction and use of forest products in Liberia pay little or no attention to the invaluable environmental services the nation's forests provide. Drawing on information gathered through interviews and the review of refereed papers on forestry and climate change mitigation and adaptation, the paper outlines and examines a number of forest management options with the strongest potential to stem the dire tide of climate change. It begins with a description of the forestry sector - including its economic significance, management challenges and related issues and concerns, proposes mitigation and adaptation options of the sector, presents a pathway to potential investment and financial flows for these options and concludes with a number of considered recommendations.

Economic significance and relevance

In 2002, the forest sector accounted for the highest contribution, 65%, in foreign exchange earnings. It generated up to USD20million in government revenues and around USD100 million in export earnings. These numbers are, probably, underestimations due to transfer pricing and corruption that were prevalent at that time. Before the war, there were 30 private companies (27 saw mills 3 plywood mills in the timber processing industry). The war destroyed 20 of these facilities and currently, only 9 saw mills and 1 plywood mill remain but are dormant. The estimated installed capacity of these mills is about 95000m per annum. The industry is still almost entirely

¹ Brown, S., Masera, O. & Sathaye, J. 2000. Project-based activities. In: R.T. Watson, I.R. Noble, B. Bolin, N.H. Ravindranath & D.J. Dokken (eds.). Land use, land-use change and forestry: A special report of the IPCC, Cambridge, United Kingdom; Moura-Costa, P. 1996. Tropical forestry practices for carbon sequestration. In: A. Schulte & D. Schione (eds.).

Dipterocarp forests ecosystems: Toward sustainable management. Singapore: World Scientific; Kramer, & Mercer, D.E. 1997. Valuing a global environment good: U.S. residents' willingness to pay to protect tropical rainforests. Land Economics, 73(May): 196-210; Perrings, C. 1995. Biodiversity conservation as insurance. In: The Economics and Ecology of Biodiversity Decline, p.69-78. T. Swanson (ed.). Cambridge: Cambridge University Press;

² Hoogeveen, H. Forests and climate change: From complex problem to integrated solution. See also UN Chronicle Online Editions (<http://www.un.org/Pubs/chronicle/2007/issue2/0207p36.htm>)

log export-oriented, with sawn timber and plywood constituting but a very small proportion of the total export.³

- **Employment and gross domestic product.** The sector delivered 7000-8000 jobs in the recent past⁴ but what this number means as percentage of the country's total work force is not known and these jobs are rural, informal and paid less than USD50 per month. IMF, as quoted elsewhere, reported that timber contributed 20-22 % of GDP.⁵ There also are forestry-related activities that provide employment but are not featured in government statistics. They include hunting of wild animals and the gathering, processing and marketing of other non-timber forest products (NTFPs) such as nuts, fruits, rattan and mushrooms for consumption and cash income generation. The trading of bush meat from Liberia in the export market, for example, generated USD42million per annum (including subsistence)⁶, but no such reliable information on plant-based NTFPs is available. Unlike timber and agricultural products, no comprehensive monitoring or evaluation, market chains and socio-economic contributions of NTFPs have been as equally investigated in Liberia.
- **Fiscal revenues and trade equilibrium.** The most common fees that apply to the forest sector as a source of revenue are: (a) Stumpage fees (i.e. royalties based on the amount of timber harvested), (b) Post-harvest fees (based on the value of processed products), (c) Profit taxes (a form of corporate tax), (d) Export taxes, (e) Concession taxes (i.e. a lump-sum fee paid on obtaining a concession), and (f) Area taxes (charged on an equal and annual basis on each hectare/acre under concession). In addition to these, there may be fees for certain services provided by the forestry authorities, such as fees for transport licenses. Likewise, there may be specialized taxes, such as reforestation or conservation fees that aim to better internalize the externalities associated with harvest. There seem to be no fines and penalties to further internalize the costs of unacceptable behavior, such as over-harvesting and other illegal practices that are environmentally or socially unacceptable and destructive.

There isn't any defined international trade policy for this sector from which one could assess trade equilibrium. However, analysis of Liberia's trade statistics shows that the export sector is limited to few unprocessed primary agricultural and mineral products with limited value added. These include logs, rubber, cocoa, coffee, gold and diamond.

³See Blaser, J. & Dagbe, B.V. 2008. Assessment of the current status of the forest sector in Liberia and identification of priority needs for development assistance through ITTO project activities; FDA/ITTO/Intercooperation, Methot, P, Appiah, S., Simpson. & Sio, F.K. 2005. Timber and the rebuilding of Liberia. Tropical Forest Update, 15(3):3-6.

⁴ Methot, P, Appiah, S., Simpson. & Sio, F.K. 2005. Timber and the rebuilding of Liberia. Tropical Forest Update, 15(3):3-6.; USEmbassy. 2008. Doing business in Liberia. Economic/Commercial Section, United States Embassy. Monrovia, Liberia. August 2008.

⁵ NAPA. 2008. Liberia National program of action (NAPA). GoL/GEF/UNEP.

⁶ Blaser, J. & Dagbe, B.V. 2008. Assessment of the current status of the forest sector in Liberia and identification of priority needs for development assistance through ITTO project activities. FDA/ITTO/Intercooperation.

Major imports have been fuel and lubricants, transport equipment and tools, foodstuff (rice, canned goods, etc), manufactured goods (including plywood and wooden furniture), and chemicals. These items averaged 83% of total inputs during the decade before the war. A trade deficit has reportedly occurred and had increased from USD69.2million in 2000 to USD83.7million in 2001.⁷ This situation does not seem to suggest a trade equilibrium.

- **Regional development.** There are several regional (West Africa) organizations whose offices could be tapped to accost the challenges of the changing climate. These include the Mano River Union and ECOWAS, founded in 1973 and 1975, respectively, to promote economic integration. Liberia is one of the founding members of these regional groups. Other prominent regional and African-wide institutions are the West African Rice Development Association (WARDA), African Forest Law Enforcement and Governance (AFLEG), New Partnership for Africa's Development (NEPAD) and the African Union (AU). In addition to these economic regional organizations, transboundary peace parks are being established in West Africa involving Cote d'Ivoire, Guinea, Liberia and Sierra Leone. Currently, no institutional arrangement of any kind among these countries is in place to deal with the consequences of climate change. Liberia has the strongest potential and to some extent the responsibility to take advantage of these regional structures to organize such a regional climate group of member nations, out of the fact that she has the greatest share of the Upper Guinean Forest ecosystem, relatively smaller portions of which are located in Cote d'Ivoire, Ghana, Guinea, Sierra Leone and Togo. Climate change is clearly a global phenomenon but it needs regional action because most of its impact is unlikely to remain confined to the boundaries of one country. This obvious fact needs to be interpreted into action within this region.

National greenhouse gas emissions/removals and mitigation needs

Increased temperature and decreased rainfall have been reported in Liberia and were recorded in 43 years of observation.⁸ In 2007, EPA reported the various types and sources of greenhouse gases and emissions in the energy sector in which CO₂, predictably, had the highest value (3,696 Gg).⁹ This is a good beginning but there has to be more of this very useful work so that a trend can be established to inform policy. Studies to estimate the types and quantities of GHG emissions of the forest sector are being carried out at the GIS laboratory of the FDA and the Climate Unit of the EPA. The current report by the EPA on forest sector GHG emissions only shows the various types and expanse of forests (in hectares)¹⁰ The most significant challenge to estimating these

⁷ Based on EPA.2007. Inventory of GHG emissions of the energy sector of Liberia. Monrovia.

⁸ Based on UNDP, Climate Change profiles :Liberia (<http://country.profiles.geog.ox.ac.uk>)

⁹ Based on EPA.2007. Inventory of GHG emissions of the energy sector of Liberia. Monrovia.

¹⁰ Nyenka, J. 2007. Greenhouse gas inventory in land use change and the forestry sector. Environmental Protection Agency. Monrovia, Liberia.

emissions is the absence of a land use plan. Clearly, the territory and natural resources of Liberia face a number of competing sources, including agriculture, forestry, mining and human settlements.

In order to balance pressure among the sectors, as well as between commercial, community and conservation interests, a national land-use plan is a vital pivot. One way to address these competing demands at the time is to ensure that the EPA, as envisaged in the Environment Protection and Management Law of Liberia, has sufficient capacity to harmonize the policies adopted in different government sectors, and to arbitrate in the disputes of land-use using sound technical criteria. A Land commission is being organized for more than a year now to attempt to settle all land disputes in the country. It has yet to begin work. As empirical data linking GHG emissions and the changing climate to forest (mis)management are being collected, it is reasonable to suggest that the nation's diminishing forest cover is undoubtedly a (if not the) major contributing factor to climate change. The changing climate imposes a felt threat on both the energy and health sectors. Key production systems in fishery and forestry have also experienced reduced productivity and sea-level rise is threatening a number of coastal communities. All these changes are linked to changing climatic patterns on the global and national levels.¹¹ Solutions are therefore being sought by a number of government institutions, international NGOs and the World Bank in various ways, mainly out of what some view as their funding mandate and interest or institutional functions and responsibility:

- **The Alternative to Deforestation Proposal by the Forestry Development Authority (FDA).** A proposal is being circulated at the FDA about finding an alternative to logging. Liberia is one of the first cohort of partners in the World Bank's Forest Carbon Partnership Facility (FCPF)¹², which will provide funds to prepare Liberia to market her carbon credits when and if an international system of carbon trading is established. This will be decided at COP15 of the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in December 2009. If, as hoped, a new instrument is signed, carbon trading in Reducing Emissions from Deforestation and Degradation (REDD) would commence in 2012, with potential benefits to Liberia accruing by 2017. Besides the series of workshops on REDD readiness that have been conducted to build local capacity, nothing much has happened as far as the instrument in point. Liberia has recently attended COP4, held in Geneva few weeks ago.
- **EPA's NAPA proposal.** The National Adaptation Program for Action (NAPA) of the Environmental Protection Agency (EPA) proposes several adaptation initiatives in 2008 that are purposed on reducing the adverse effects of climate change on a

¹¹ Based on NAPA.2008. Liberia National program of action (NAPA).GoL/GEF/UNEP; United Nations Development Programme climate change profiles :Liberia (http://country_profiles.geog.ox.ac.uk).

¹² Based on FDA.2009.A road map: Alternatives to commercial logging in Liberia – a policy guideline for consideration. Forestry Development Authority, March 2009.

range of sectors, while promoting sustainable development. Those sectors with the highest priority on the basis of the degree of vulnerability are: (a) Agriculture – integrated crop/livestock farming systems, (b) Forestry and wetlands – switching from fossil fuel- to biomass-based energy products, (c) Fisheries- promoting energy efficiency and conservation, (d) Water- awareness and sensitization about the importance of water resource management, (e) Coastal zones –development of an integrated coastal zone management plan, (f) Meteorological –rebuilding the national meteorological monitoring network, and (g) Public health –use of insecticides treated materials (ITMs), ranked first under the health sector.¹³

- **COPAN.** A World Bank-proposed project entitled *Liberia: Consolidation of Liberia protected area network (COPAN)*, to be funded under the GEF Trust Fund (GEFTF). The aim of the project is to consolidate and expand the Liberian protected Area Network. The main components of the project focus on the creation of three new protected areas – Gola Forest, Lake Piso, Wonegizi Forest - and the strengthening of the National Conservation Policies and Institutions (strategy, law, financial mechanisms). The project will also promote the adoption of integrated approaches through other components which will support capacity building, the development of sustainable livelihood for communities and the preparation of Memorandum of Understandings (MOUs) with Sierra Leone and Guinea partner institutions for management of transboundary protected areas.¹⁴

Technological and/or management challenges

- **Lack of competent man-power.** Because the forestry sector lost almost all of its competent professionals in the war, a pool of trained and skilled man-power is urgently needed to rebuild the physical, production, institutional and human infrastructures that are coherent and supportive of the principles and practices of Sustainable Forest Management (SFM). Further, forest management continues to pay little attention to some of the essential elements of SFM such as the design, development and management of profitable and an efficient value-added wood processing sector. All of this will require extensive financial and investment flows from both the private sector and the government that will be difficult to achieve without support of the international community.
- **Lack of basic knowledge of the resource and its utilization.** Of the 240 timber tree species identified in Liberia, only 42 premium ones are in the timber market. These are being exploited to extinction and are largely undervalued. A major constraint to SFM, however, is the lack of knowledge on the state and potential of the forest resource itself. Information on growth dynamics of the forest is

¹³ Based on NAPA.2008.Liberia National program of action (NAPA).GoL/GEF/UNEP

¹⁴ Based on World Bank.2008.Liberia:Consolidation of Liberia protected area network(COPAN).Washington (DC), USA.

totally lacking and the national annual allowable cut (AAA) is unknown.¹⁵ There is no strong scientific basis for the current rotation period of 25 years for all forest types and there hasn't been a comprehensive forestry inventory in Liberia for the last 40 years. Records on logged over areas and volume extracted over decades of destructive and unregulated logging are at best sketchy and incomplete, at worst, largely unreliable. The scarcity of information makes it difficult to make reasonable conclusions as to the size and nature of the resource. A number of FDA staff is attending various workshops with government and international support, by international experts in Liberia and out of the country on this issue.

- **A system of low forest revenue collection.** Because forests are by and large owned by the state, one of the ways to increase public expenditure is to increase forest charges and revenue collection. However, a number of studies have shown that forest revenue collection – largely as stumpage fees and rentals - is low in many countries, including Liberia.¹⁶ Low forest revenue not only has negative impact on total government revenue and expenditure, but also sends incorrect price signals to the market about the value of forests and wood. Such messages are damaging to sustainable forest management in that low prices can result in overharvesting and undervaluing of the resource, both of which contribute to deforestation and forest degradation.
- **Deforestation.** The 4 major causes of Liberia's diminishing forest cover are: (a) Logging, (b) Swidden farming, (c) Mining and (d) The clearing of forest lands to plant tree crops for cash and for biofuel (oil palm).

Currently huge portions of old growth forests are being cleared in some parts of Liberia to establish energy plantations and for commercial agriculture. Converting native habitats, such as old growth forests, to cropland releases CO₂ due to burning or microbial decomposition of organic carbon stored in plant biomass and soils, because soils and plant biomass are the two largest biologically active stores of terrestrial carbon - together containing about 2.7 times more carbon than the atmosphere.¹⁷ Competing land uses will continue to diminish forest cover in Liberia until land is classified as to its best use. The issue of land use planning is as much a national challenge as is climate change, however.

- **Illegal logging** – harvesting in excess of authority, or avoiding taxes, is quite a multifaceted forest management problem. In addition to its financial costs, it has

¹⁵ Blaser, J. & Dagbe, B.V. 2008. Assessment of the current status of the forest sector in Liberia and identification of priority needs for development assistance through ITTO project activities. FDA/ITTO/Intercooperation and Method, P, Appiah, S., Simpson, & Sio, F.K. 2005. Timber and the rebuilding of Liberia. Tropical Forest Update, 15(3):3-6.

¹⁶ Grut, M., Gray, J.W., & Egli, N. 1991. Forest pricing and concession policies: Managing the high forests of West Africa and Central Africa. World Bank Paper No. 143. Washington, DC, World Bank; FAO. 1983. Forest revenue systems in developing countries. FAO Paper No. 43. Rome; Blundell, A.G. 2008. On the benefits of incorporating forestry into the extractive industries; with specific reference to Liberia.

¹⁷ Schlesinger, W.H. 1997. Biogeochemistry: an analysis of global change. Academic Press, San Diego.

social and governance impacts. Persistent impunity for illegal loggers in the sector challenges the authority and legitimacy of the state. Hand in hand with erosion of the rule of law is the entrenchment of corruption; all of which has implications not only for economic development but for the security of already vulnerable rural people. A review of forest concessions operating in Liberia between 1997-2003 found that almost all logging companies –and there were 72 of them- were in violation of the most basic concession conditions set by government, such as the minimum legal requirements of (a) Articles of incorporation, (b) A valid business license, (c) A valid contract, and (d) A performance bond. Given this environment, which included a complete lack of financial transparency, loggers appear to have evaded up to USD200 million in taxes. These funds often went to corrupt payments and ultimately aided in the purchase of weapons that fueled a brutal war which destabilized the entire region.¹⁸ Illegal logging remains the greatest challenge from the revenue collection viewpoint.

- **Land (and property) rights.** Liberia currently has a dual land tenure system – customary and statutory. Unlike the statutory system in which land is owned through a deed or by purchase, the customary system is ancestral. In rural Liberia where over 80% of the population lived for centuries before the recent conflict, rights to land by ancestry dominates. The imposed statutory system provided the legal basis for the rubber, timber and mining concessions that become the foundation of Liberia’s resource economy. As these industries expanded and acquired more of what had been customary land, traditional users found themselves excluded from the land base and economy, except as workers – often poorly paid – on plantations or mining or forestry concessions. Over time the lack of access grew acute, and was in fact one of the root causes of Liberia’s civil war. Post war, the issue continues to affect every aspect of natural resource exploitation, including forestry, rubber and diamond mining. Under Liberian law, for example, subsurface mineral rights are vested solely in the national government. Surface land owners have no claims to what lies below. If anyone lives in a natural forest, even if he acquires the land customarily, he cannot cut any of the trees on it because such trees belong to the state. Only planted trees can be owned hence cut by any private entity. Customary and tribal laws view things differently. This will continue to generate conflict whenever forests, gold, diamond or other minerals are found beneath traditional land and are harvested. For example, forest lands are currently contested in various parts of Liberia, particularly between national part management and communities within close

¹⁸ Blundell,A.G.,Bodian,A., Callamand, D, Fithen,C. & Garnett, T.2003.UN Report on the Impact of Timber sanctions on Liberia.UN Security Council Document S/2003/779 & 973; Blundell.2007.UN Report on compliance with UN sanctions on Liberia.UN Security Council Document S/2007/374; Rochow,K.W.J.,Simpson,R., Brownell,R.,Pierson,O.2006.The Liberian concession review :Lessons for resource management and restoration of the rule of law.Journal of Peacekeeping and Development,3:89.

proximity of the parks. The need for land reform is indeed dire. A Land Commission has been formed few months ago to deal with this problem.

Description of the forestry sector

Status of the forest sector and trends

Liberia's forests are among the world's most exceptionally diverse forest ecosystems. They have high rates of endemism and are a home of most of the wildlife species that are fleeing the scourge of deforestation and related activities and are at the verge of extinction in the other countries of the Upper Guinean Forest ecoregion (UGF), a humid coastal rainforest belt stretching across six West African countries, including Liberia. The threatened faunal species include Chimpanzee (*Pan troglodytes*), Red colobus monkey (*Piliocolobus badius*), Diana monkey (*Cercopithecus diana diana*), Pygmy hippopotamus (*Hexaprotodron liberienses*) and forest elephant (*Loxodonta africana cyclotis*). At the close of the millennium, Liberia harbored the largest remaining proportion of the UGF, 43%, followed by the Cote d'Ivoire (28%), Ghana (16%), Sierra Leone (5%), and Togo (1%).¹⁹ Liberia's forests now have the highest populations of elephants in West Africa, over 2900 flowering plants, including about 240 timber species, and about 125 mammal species, 590 bird species, 74 known reptiles and amphibians and over 1000 described insect species.²⁰ In 1999, the West African Conservation Priority Setting Exercise brought together 150 experts in forestry, ecology, economics, politics and sociology of West Africa. This group identified Liberia as the top priority country for biodiversity conservation in the ecoregion.

Current forest cover

- **Forest area.** In late 1959, mature forests covered more than 90% of Liberia.²⁷ Today, Liberia's forests are diminishing at a rate that no one knows with any degree of accuracy. This erosion is, in most cases, an irreparable loss of one of this nation's invaluable natural resource. Though the war may have provided respite to some forests in Liberia and the ecoregion by displacing forest-dependent households, but it also has translated into poor or non-existent management of parks. The war also increased logging and bush meat hunting, as well as mining.²¹

The latest and most reliable data on the expanse of Liberia's forest is that closed and open dense forests covered about 2.4 million and 1.0 million hectares, respectively,

¹⁹ Sayer, J.A., Harcourt, C. & Collins, N.M. 1992. The conservation atlas of tropical forests: Africa. World Conservation Monitoring Center, Cambridge, United Kingdom.

²⁰ Quansah, C. 2008. An overview of non-timber forest products with good potential for promotion in Liberia. A report submitted to Forest Trends, Washington, and DC. USA.; And Based on FDA. 2000. Annual Report. Forestry Development Authority.

²¹ Garnett, D. & Utas, C. 2000. The Upper Guinea Heritage: Nature conservation in Liberia and Sierra-Leone. IUCN, Amsterdam, The Netherlands.; and Libbie, A.R. 1998. The No. 2 River Forest Reserve, and Sierra Leone: Managing for biodiversity and the promotion of ecotourism. Report submitted to UN Project No. SIL/93/002.

while secondary and degraded forests cover about 2.2 million hectares²² of Liberia's total land area of 9.6 million hectares. In the same year when the "most reliable data" was published, another paper reported that between 1990 and 2005 Liberia's forest area reduced by 22 % countrywide.²³ The current size of forest cover still remains a question to date.

- **Forest management policy and implementation strategy.** Liberia recently embarked on a forest reform process that has included the revocation of all previous timber concessions, a new forest policy, revised forest legislation and issuing of supporting regulations. The new forest policy seeks to integrate Community(C), Conservation (C), and Commercial (C) uses and management of forest resources – the 3C policy- with sustainable forest management as the explicit goal. In 2007, a new Forest Management Strategy was formulated and validated through public consultation with stakeholders, including representatives from local NGOs, timber mining interests, and forest-adjacent, forest-dwelling communities. A **Community Rights Law With Respect to Forest Lands** has been drafted and is awaiting approval by politicians. That law provides the legal framework for community forestry and the responsibilities of communities within the proximity of forests throughout Liberia. The implementation strategy of the new policy provides the framework for the realization of its goals and includes, in addition to the 3C policy, cross-cutting issues and activities (land tenure, ownership and land use planning, public administration, research, information, education and training, legislation and law enforcement). An implementation strategy is defined for each of the key uses as listed above.²⁴

Trends in terrestrial greenhouse (GHG) emissions and removals

Four key sets of activities that laid the foundation for the eventual removal of GHG emissions are outlined here. These efforts appear to have begun with the development of baseline climate scenarios for the country. For this purpose, twenty-nine (29) years (1953-1982) (the period) of climate data, extracted from six hydrological and meteorological stations across Liberia, was collected. In that period, the climate of Liberia and neighboring countries showed almost equal distribution of wet/cool and dry/warm years.²⁵ Second, on November 5, 2002, Liberia ratified the United Nations Framework Convention on Climate Change (UNFCCC) and as such, a signatory to the

²² Methot, P, Appiah, S., Simpson. & Sio, F.K. 2005. Timber and the rebuilding of Liberia. Tropical Forest Update, 15(3):3-6.

²³ Based on FAO.2005. Global forest resources assessment 2005: Progress towards sustainable forest management, Forestry Paper 147.

²⁴ Based on FDA.2006. National forestry policy and implementation strategy. Monrovia

²⁵ Wiles, D.L.2005. Coastal zone vulnerability and adaptation to climate change in Liberia. Paper presented at the Training Workshop on Adaptation and Vulneration to Climate Change, Maputo, Mozambique, and 18-21 April 2005.

Kyoto Protocol. This signaled a commitment to fulfilling the obligation for reducing GHG emissions. The NAPA (see 1.2 above) is the first environmental program that directly relates to climate change. The Liberia Carbon Working Group, formed in Liberia in 2007, is the third example of the concrete steps taken towards reducing GHGs.

The Carbon Working Group, co-hosted by FDA and the EPA, includes members of several government institutions such as the Ministry of Lands, Mines & Energy (MLME), Ministry of Planning and Economic Affairs (MPEA), the National Investment Commission (NIC), several international non-governmental organizations and lending institutions. This Working Group is leading the integration of reducing deforestation and carbon financing into Liberia's national forest management strategy. It is also collaborating with the government to identify pilot sites for project implementation, builds capacity in the government with respect to carbon financing, analysis of deforestation trends and future land use scenarios. Most of these are excellent plans that have to be implemented. Fourth and finally, the National REDD Strategy. This Strategy is part of the Government's broad development agenda for the country as it emerges from war. It is led again by the Carbon Working Group and is guided by the FDA's Community Forestry Working Group to address the major causes of deforestation and forest degradation, notably shifting cultivation, unregulated logging, unregulated hunting and gathering activities, and unregulated artisanal mining.

Technologies and practices

There are few mainly uncoordinated endeavors in Liberia to address climate change issues. The four institutions that are currently engaged in these and related activities are Conservation International (CI) and 3 government institutions namely FDA, EPA, and the MLME. CI is taking the lead in preparing locals to acquire the requisite skills and competence for REDD readiness. Towards this end, it has influenced and provided the financial and technical resources that encouraged establishment of additional national parks (to stem deforestation), formed and supports the Carbon Working Group, convened workshops on REDD readiness and other pathways to capture carbon and has encouraged partnership between Liberia and international institutions to improve the local knowledge base about climate change and what can be done in Liberia to address this problem. The EPA is a leader in the national quest to get government to act and to court international assistance. Its Climate Change Unit (CCU) has been quite active in keeping the government informed about the changing global climate and the observed impact on the nation.

The EPA also helps in organizing other state institutions so that focused climate mitigation and adaptation measures are defined and undertaken to avoid needless competition, duplication hence mismanagement of scarce government finances. More importantly, the EPA, through the CCU, engages national and international experts to serve as consultants in tackling some of the difficult research and development issues it identifies. The MLME has been supporting the EPA not only morally but by housing the

Liberian Hydrological Services (LHS) which collect and collate vital data to strengthen planning and other activities of the EPA. The FDA, using its newly installed GIS laboratory and partnership with international institutions, is compiling data that could contribute to forest change analysis. For example, two main studies provide information on recent changes in forest cover, including one with a two-hectare minimum mapping unit produced by the FDA, CI, South Dakota University and Clark Labs. The FDA has also established permanent monitoring plots and conducted some initial biomass estimates. More could be covered in this section; it is hoped that these few key examples will suffice. The activities presented here are more co-ordinated and focused than those presented in section 1.2 above.

Interaction with adaptation and sustainable development

Adaptation is defined as adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects, that moderate harm or exploits beneficial opportunities. This definition reflects the synergies between adaptation and sustainable development, but these are hardly treated as a unified force to deal with climate change issues in forest management in Liberia, at least on the basis of reviewed papers. The NAPA that espouses the EPA's approach to climate change adaptation, for example, made no reference to the Poverty Reduction Strategy (PRS)²⁶ that mirrors the government's sustainable development goals (in a sense), although NAPA subscribes to the Millennium Development Goals (MDGs). The PRS has nothing to say about what should be done to deal with the threats of Liberia's changing climate; it, however, considers sustainable use of natural resources and strong environmental management to be crucial for enhancing broad based growth, creating meaningful jobs and reducing poverty. The stated forest management objectives make no reference to climate change and PRS in any meaningful way. This problem is not unique to Liberia (and does not have to be so to become a problem). A group of authors found that the concept of sustainable development and the methodological and substantive arguments associated with it are notably absent in climate change literature.²⁷

²⁶ Based on GoL.2006. Interim poverty reduction strategy: Breaking with the past-from conflict to development. Government of Liberia.

²⁷ Jaeger, C.C., Renn, O., Rosa, A.E. & Webler, T.1998. Decision analysis and rational actions. In: Human Choice and climate change, tools for policy analysis, 3:141-. Battelle Press, Columbus; and Young, O.1998. Institutional dimensions of global environmental change. International human dimensions programme, Report No.9, IHDP.

Proposed mitigation measures for the forestry sector

Forestry is uniquely positioned to make a very significant contribution to a low-cost local and national mitigation portfolio that provides synergies with adaptation and sustainable development. This opportunity, regrettably, is not taken fully into consideration in the current approach to forest management which the key management challenges listed earlier in this brief embodied. Activities planned in Liberia, particularly by the EPA and FDA; remain on printed pages because of the lack of funds in some cases but largely on account of the want of skilled and competent staff. This lack of appropriate man power explains why proposed plans to deal with the felt impact of climate change do not in any way match the magnitude of the problem in practice. Under the mitigation options of reducing emissions and increasing carbon sequestration, the 4 forestry options often considered are: (a) Reducing emissions from deforestation and forest degradation (REDD), (b) Enhancing carbon sinks through enhancing the sequestration rate in existing and new forests, (c) Providing wood fuels as a substitute for fossil fuels and (d) Providing wood products for more energy-intensive materials.²⁸ Properly designed and implemented forestry mitigation approaches can have substantial co-benefits in terms of employment and income generation opportunities, biodiversity and watershed conservation, provision of timber and fiber, as well as aesthetic, cultural and recreational services. At this time for Liberia, a, b, and d are quite relevant and the country has the strongest potential to implement these successfully if serious and determined steps are taken for this purpose. The Afforestation/Reforestation Clean Development Mechanism (A/R CDM) is also proposed for Liberia. These options are briefly outlined in the following section.

Increasing or maintaining forest area

- **Reducing deforestation and forest degradation.** Deforestation is defined as direct human-induced conversion of forested land to non-forest uses.²⁹ There is no much agreement on the definition of forest degradation, as it is with deforestation. In spite of the debate over definitions, it is important to note that deforestation (including land-use change and forest degradation) are the main emission sources in many developing countries³⁰, and undoubtedly in Liberia, given the impact of the drivers of deforestation and forest degradation listed earlier. The attempts to increase the number of protected areas, and the

²⁸ Lasco, R.D., Pulhin, F.B., Roshetko, J.M. & Banaticla, M.R.N.2004.LULUCF climate change mitigation projects in the Philippines: A primer. World Agroforestry Center.; and Stern, N.2006.Stern review: The economics of climate change. Cambridge University Press, Cambridge, United Kingdom.

²⁹ Based on ³⁸UNFCCC.2006.Background paper for the workshop on reducing emissions from deforestation in developing countries.Working Paper No.1.

³⁰ Stern, N.2006.Stern review: The economics of climate change. Cambridge University Press, Cambridge, United Kingdom.

creation of a Carbon Working Group, among others, are good examples of current effort, as well as the activities NAPA proposes and are being implemented. It must be said here, however, that increasing the number of protected areas in the country without fully protecting them serves no purpose. The two protected areas Liberia now has (Sapo National Park, East Nimba Nature Reserve) are either under siege or their creation questioned by communities in close proximity. The Sapo National Park is, to date, occupied by hunters and miners. Liberian forests are endowed with a myriad of non-timber forest products (NTFPs) many of whom are not even known to science. NTFPs research and development is undertaken by various groups and institutions here in Liberia and out of the country in a much uncoordinated fashion. If economic returns from non-timber forest products (whose collection and use will not involve removal of trees), are accrued to forest-adjacent, forest-dwelling communities, then the management of NTFPs could help conserve protected areas so their function to capture and store carbon is sustained.

- **Afforestation /Reforestation under CDM.** There have been no afforestation projects in the past or at present. However, the FDA had established more than 10,000 hectares of forest plantations, with both exotic and indigenous forest tree species. Some plantations were established to produce pulp for a pulp and paper industry that was to be built in Liberia, but the war made this an unfulfilled venture. Other tree plantations were established on clear-cut areas; and before and after the war, thousands of seedlings have been planted annually in many parts of the country through the FDA's National Tree Planting Day initiative, an annual event. The status of plantations in these various categories is not known. For example, there is no information about the number of trees that are alive or dead per each of the plantation types, whether they have been infested by pest and diseases, or fire, and whether they have reached harvesting age. Further, there are tens of thousands of hectares that are planted to rubber and oil palm by private individuals and groups. These, undoubtedly, increase the size of vegetative cover and have served as carbon sinks for many years.

Forest management

- **Strengthening and enforcement of existing laws against illegal logging.** Illegal logging and other forest sector crimes are a major driver of deforestation and forest degradation. All projects must demonstrate much consideration of the causes of weak law enforcement beyond the often mentioned culprits of "insufficient funds and capacity".
- **Design, establish and manage agroforestry** systems and component technologies to support climate change mitigation initiatives.
- **Limit forest concessions to a manageable number** so that monitoring regimes are enforced to the letter to discourage abuses.
- **Redefine forest management so that it forthrightly** describe the task of forest management and the role of forest managers(e.g. Forest management is fitting

and maintaining multiple uses and services into forest ecosystems according to their capability to support them(the uses), compatibly with other uses on the same or adjacent lands, and in ways that assured the permanence of the uses, the resources and their benefits for future generations.

- **Make the preparation of practical and verifiable forest management plans a must** for both forest management contracts(FMCs) and timber sale contracts(TSCs), not in the current case in which only timber management contractors are required to prepare such plans.
- **Plan and effect research so as to** (a)identify, document and assess Liberia’s rich and diverse non-timber forest-based resources and products, (b)broaden the knowledge base about the value(s)(cultural, ecological, economic, social) of those tree species that are classified as ‘minor’ and others that are yet to be known to science for any uses and functions,(c) re-establish permanent sample plots to conduct growth studies (to determine volume equations) and forest inventory as an approach to calculating (estimating reasonably accurately) the annual allowable cut (AAC),(d) determine the size, location and integrity of Liberia’s watersheds, and propose a set of activities for their management (including protection, rehabilitation), (e) determine the actual size and types of forest lands and types of forests, as well as other vegetative cover, (f)assess the potential sources of investment and finances to break the habit of forestry that prioritizes timber mining (Liberia must conserve and protect most of what is left of her forest and must in this decade invest in plantation forestry on the reportedly hundreds of thousands of degraded landscapes that have no any other uses that tap their value).
- **Invest in participatory forest resource management initiatives.** Making forest-adjacent, forest-dependent (forest-based) communities managers of forests closest to them is a vital pivot for credible and sustainable forest management. Liberia must do away with the current over-centralized, entirely top-down and almost entirely single-product (wood)-focused forest management strategy. Forest-based communities still live in a disabling environment of policy and practice that overrides some of the positive effects of increased participation and ownership. Broader regulatory policies continue to favor urban-based and local elite access to forest resources or enable them to enjoy benefits from the forest at the expense of local smallholders and the poor. These communities continue to suffer from outsiders’ commercial exploitation of forest resources, and it is clear that vast profits are extracted through many commercial activities but little or nothing is returned to local hands. There is foot-dragging by political leaders to endorse the **Community Rights Law with Respect to Forest Lands** in several months now – and fears are harbored about an elite take over if communities are granted rights (access, mainly ownership) to their forest lands, the key issue that this “law” is advocating. The ceding of forests only to logging companies represents a significant loss of forest-based livelihoods, as well as cultural uses of the forest. In relatively lawless regions, security forces intimidate

community members, violating human rights, in order to protect logging operations and gain access to forests.³¹

- **Reform the revenue collection system.** Focus more on post-harvest fees than on pre-harvest ones. As IMF suggests, post-harvest fees have several advantages over pre-harvest fees in that they can be applied to timber that has been illegally harvested and allow government to provide escalating tax breaks to encourage companies to engage in more labor-intensive processing in a country, beyond raw logs to products such as sawn wood and veneer, progressing up the value chain to products like molding, and even more labor-intensive products like furniture.

Changing forest management

- **Management of natural forests.** Management strategies for natural forests such as enrichment planting, enhanced natural regeneration, reduced impact logging, etc, are normally not employed. Logging remains destructive and it is in total disregard of the survival of regenerants (young seedlings that grow naturally on the forest floor: baby trees). Timber harvesting is only permitted in areas of forest designated for logging. Current logging practices involve the setting of minimum diameter cutting limits, annual allowable cuts and cutting cycles. The sustainability of these practices inevitably depends mostly on the regeneration capacity of the forest and the harvesting modalities (intensity of extraction and the rate of damage) which continue to be destructive and degrading. For **plantation forestry**, there are no other efforts besides those mentioned under reforestation.

Substitution of energy intensive materials

Clearly the substitution of products from sustainably managed forests for carbon-intensive and other forest products, or for carbon-intensive fuels offers an opportunity for the permanent removal of GHG emissions. Harvested wood is often exported as logs and this is also true for plant-based NTFPs. This sector has a longer way to go to fulfill the requirements for carbon-intensive and other forest products/carbon-intensive fuels, compared with the other options that are the subject of the paper.

Bio-energy

The closest Liberia has got to bioenergy is her heavy dependence on wood fuel. At present, wood fuel (firewood, charcoal) provides nearly 95% of Liberia's energy needs (heating, cooking) and there are no efforts directed towards processing wood

³¹ Based on Rochow, K.W.J., Simpson, R., Brownell, R., Pierson, O. 2006. The Liberian concession review: Lessons for resource management and restoration of the rule of law. *Journal of Peacekeeping and Development*, 3:89.

(gasification) to power the transport and lighting (electricity) industry. This heavy dependence on wood fuel has been one of the major contributing factors to deforestation and forest degradation. It is estimated that 960,000 trees of varying sizes are felled annually to produce charcoal for the Monrovia area alone³⁹ and charcoal accounts for 9% of GDP in 1999.³² There, however, are many plantations of biofuel species in many parts of the country, oil palm in particular.

Agroforestry systems and component technologies (A/R CDM)

In Liberia where swidden farming diminishes forests and increases the size of degraded lands each year, agroforestry will address shifting cultivation by diversifying farming, making it relatively sedentary. Agroforestry refers to the planting of trees among or around crops or on pasture land as a means of preserving or enhancing the productivity of the land. More technically, agroforestry is defined as “a dynamic, ecologically-based natural resources management system that, through the integration of trees on farms and other areas of the agricultural landscape, diversifies and sustains production of increased social, economic and environmental benefits^{41, 42}. In many parts of the world, smallholder agroforestry systems are tree species-rich systems producing non-timber and timber products for both home use and market sale. Agroforestry as a system or a technology can sequester large amounts of carbon that are retained in the biosphere over time⁴³. While the individual systems and technologies may be of limited size on a per area basis, smallholder systems accumulate significant amounts of carbon, equal or beyond the amount of carbon stored in degraded forests. Their ability to simultaneously address smallholders’ livelihood needs and store large amounts of carbon makes smallholder agroforestry systems (and technologies) viable types of project under CDM, with its dual objective of emission reductions and sustainable development.

³² Drakenberg, O. 2008. Draft Liberia environment and climate analysis. School of Economics and Commercial Law, Environmental Economics Unit. Goteborg University, Sweden.

Key issues in assessing investment and financial flows

Data availability and other information constraints

- **Policy and institutional framework supporting REDD and CDM activities.** The sector, in tandem with other government agencies and NGOs, must develop and implement the policy and institutional frame of reference that will support climate change adaptation and mitigation options. The current FDA policy and its implementation strategy do not deal with climate issues, most of whose solutions can be found in a sound and credible management of the nation's forests. The policy should, among others, define its own scope either as project-based or national-based. A national-level approach will give Liberia the flexibility to manage her collective forest resources and also avoid in-country leakage. Project-based policies would be initially easier with national level approach, literature argues, but will pose some challenges when it comes to leakage and liability.
- **Principal knowledge gaps.** There is a dearth information and the lack of pertinent skills to acquire such data about a range of key areas which are fundamental to engaging in REDD and CDM activities, as well as sustainable forest management.

REDD & CDM

- **The benefit and cost analysis of adaptation and mitigation options.** The two approaches to estimating costs and benefits are (i) bottom-up approaches, which build up from assessments of specific technologies and sectors, and (ii) top-down modeling studies, which proceed from macroeconomic relationships. This analysis is an important requisite.
- **Adequate public education on climate issues.** The Liberian public lacks even the basics about the nation's natural capital, its natural environment and the threats of climate change. In our Elementary, Junior High and High Schools, Colleges and Universities, a climatology course should be organized and introduced. Politicians and government institutions also need to be educated about the effect and impact of the changing local, national, regional and global climate and the planned actions Liberia needs and intends to undertake. Forest-adjacent and forest-dwelling communities must not be left out of this awareness creation effort.
- **Gathering of data to model the relationship between** deforestation and other competing land uses and climate change. The data when collected and appropriately analyzed, should help Liberian climate researchers to appreciate the current and projected future impact of climate change.
- **Data management and information-sharing.** Liberia grapples with the challenges of data management and information sharing, or the critical

importance of using independent monitoring and third party to ensure transparency in REDD and CDM endeavors.

- **High level land use planning coordination.** Land use planning must be institutionalized and coordinated in the various government institutions to ensure their activities incorporate REDD and CDM, and the participating institutions should be the primary delivery vehicle for newly developed national policies.
- **Putting a lid on deforestation.** Slowing or interdicting deforestation presupposes a deeper understanding of its causes and the rate at which it happens. Checking deforestation would certainly reduce emissions but implementing options and enforcing policies towards achieving this goal is often thwarted by the high opportunity cost of land and labor. We have to be certain also that/if enough land is available for the proposed climate change mitigation options given the various competitive uses for land in Liberia: shifting cultivation, logging, conservation, industrial tree plantations, energy plantations and commercial agriculture.
- **Assessment of investment and financial flows (I&FF).** Estimating investments and financial needs within confidence limits for implementing forest-based mitigation options are, inherently, difficult to undertake as they relate to different dimensions. Examples of these analytical options for the sector include using a sector model to assess the situation (assuming no change) or projections. Approaches range from simple spreadsheet models that can be applied by members of the project team to sophisticated dynamic forest management models that are designed to provide detailed tracking of annual investment costs across multiple scenarios such as Comprehensive Mitigation Assessment Process (COMAP)/GCOMAP) and Graz/Oak Ridge Carbon Accounting Model (GORCAM).³³ Because basic skills in I&FF in this and other sectors are either limited or non-existent, the better approach for Liberia at the time is the spreadsheet model, although COMAP could in the future be experimented with.

Proposed methodological approach for the sector

- **Monitoring.** Technical capacity does exist internationally to monitor deforestation via satellite, but cost-effectiveness remains an issue, as does monitoring degradation and quantifying actual carbon flows with high precision. Accurate monitoring will require internationally agreed definitions, methodologies and consistent characterization of emissions from deforestation and degradation. Liberia needs to strengthen its monitoring capacity with existing facilities at the FDA, EPA and LISGIS (Liberia Institute for Statistics and Geo-Information Services) to undertake accurate monitoring regimes.

³³ Blaser, J. & Robledon, C. 2009. Methodology guidebook for the assessment of investment flows to address climate change (Version 1.0).

- **Baseline/reference scenarios.** This reference is not restricted only to the methodological issues of measuring baseline or reference scenarios, but also their appropriate definition, as the establishment of generous baseline levels would benefit both suppliers (landowners, etc.) and buyers (industries and other corporate interests paying for carbon) of subsequent carbon credits. The essential questions here are simply about how baseline rates of deforestation should be set so as to promote equity and encourage participation, and whether they should be changed over time. Most national-level proposals set baselines in part based on a country's historic rate of deforestation (that remains a challenge in Liberia) and offer carbon credits for reducing the national deforestation rate below this reference level. However, it is reported that some countries feel this approach does not capture their need to develop, and it also neglects countries that have already lowered deforestation rate (actual), thereby failing to incentivize continued conservation.³⁴
- **Leakage.** Because of the possibility that forests might be destroyed through fire and other natural calamities, or through increased pressures on forest land, there is no guarantee of a permanent carbon reservoir and CO₂ sequestration. This threat is particularly acute where governance structures and land tenure are weak – a common problem in countries with current/potential deforestation rates such as Liberia. There is therefore a debate over whether REDD carbon credits should be temporary or permanent. But as a recent study suggests³⁵, even a one-time reduction in deforestation rates will have a permanent effect on atmospheric carbon levels, unless baseline deforestation rate is exceeded. For CDM, approved methodologies dealt with leakages by identifying the potential displacement of people or products due to the proposed project activities.³⁶
- **Design and implementation challenges for REDD.** A carbon market-based funding mechanism, such as Compensated Reduction, is the current forerunner among various REDD proposals, but numerous technical issues pose significant obstacles to design and implementation. Although these issues represent any policy attempting to curb deforestation, they are particularly problematic under a market-based REDD regime. If they are not fully resolved, a market-based REDD could fail to achieve positive outcomes, or even increase global emissions if a developing country like Liberia is allowed to sell carbon offsets from reduced deforestation that does not correspond to actual emissions reductions. For these reasons, on-market options for funding REDD must also be considered, such as using existing development assistance , creating a new dedicated fund, or even

³⁴ Davis, C.2008.Protecting forests to save the climate: REDD challenges and opportunities. Earth Trends Update, April 2008; and Watson,R.I.,Noble, I., Boliner, B. et al. 2000.IPCC Skpecial Report on Land Use, Land-use Change and Forestry.Cambridge,IPCC:377.

³⁵ Watson,R.I.,Noble, I., Boliner, B. et al. 2000.IPCC Skpecial Report on Land Use, Land-use Change and Forestry.Cambridge,IPCC:377.

³⁶ A/R CDM approved methodologies (http://cdm.unfccc.int/AR_methodologies/approved_ar.html).

redirecting revenues from a carbon tax or a national cap and trade programs. But even if these outstanding issues can be resolved, there is a real possibility that neither a market-based nor a non market-based REDD programs will yield desired outcomes when it comes to mitigating climate change or protecting forest services and communities, meaning that other policy alternatives must also be considered.

- **Addressing the concern that forest carbon price would** plummet with a large increase in forest carbon offsets and the very high transaction costs in the CDM, especially for communities and smaller projects.
- **Additional** (this occurs when carbon payments lead to additional carbon benefits compared to the situation without carbon payments; where forestry is already viable, carbon would be sequestered or conserved without the need of carbon payments).

Scenario limitations and/or assumptions

There is a host of policy and scientific questions we need to ask ourselves and for which credible answers must be found. Some of the key issues around which these questions are to be structured have been in part discussed earlier in this brief. Among the key questions are: What forestry mitigation options are most appropriate – even though we strongly believe those suggested here are - for Liberia and how should appropriateness be defined and determined? How much additional carbon stock might be created and how much emissions reduction might be achieved through these mitigation activities? What is the cost per ton of carbon for Liberia and the total costs and benefits of these options? What are the present and future demographic trends for Liberia and the corresponding land use scenarios? Baseline scenarios must also be determined as well and must represent a set of assumptions about likely changes in land use and land-cover patterns based on historical data and emerging demographic and economic trends. In the mitigation options – which in a sense are themselves scenarios – activities such as afforestation, agroforestry, forest conservation (national parks, etc) and community forestry should be explicitly identified in order to estimate within a reasonable degree of accuracy and reliability the various unknowns listed here.

Further, baseline and mitigation data on a per hectare basis for carbon sequestration or avoidance and related costs and benefits are needed to estimate the net monetary benefit per hectare. With this information, the cumulative or annual carbon flows and monetary costs and benefits over a future period can be estimated. It is also important to identify policy changes and incentives necessary for implementation. The potential barriers to implementation, and monitoring of carbon stock, raise complex issues with institutional, socioeconomic, public policy, gender role, and economic ramifications that would need to be addressed in order for these technically feasible options to be realized successfully and sustained in the field.

Capacity building

All too often, political will on climate change issues exists at the national level but the capacity to act is lacking, hindering national efforts. The first strategic step in dealing with climate change concerns is to build capacity of the sector to develop and implement sound forest management plans and projects. Table 1 summarizes a range of key sustainable forest management initiatives which, if successfully implemented, could contribute significantly to the increase of the sector's ability to capture carbon and other GHGs. An enabling environment also needs to be created in the areas mentioned in section 4 (4.1) (specifically under REDD & CDM).

Table 1. Initiatives that can develop Liberia's ability to benefit from the forest sector

Initiative/projects	Brief description of initiatives, and knowledge and capacity gaps
Agroforestry	Given the annual loss of forest land to shifting cultivation, Agroforestry as defined and discussed in the paper, is a credible and viable solution to this age-old system of farming. Besides its role in carbon capture, Agroforestry addresses one of the triggers of shifting cultivation – reduced soil fertility – among others. But, there are no local practical examples to demonstrate these and other benefits and functions of Agroforestry.
Afforestation/ Reforestation	In several counties (Lofa, Grand Cape Mount, Sinoe), forests are being gradually replaced by grasslands. There also are large areas of grasslands that occur naturally. Lands covered with naturally occurring grasslands need to be afforested and the expanding grassland areas rehabilitated through reforestation. The forest sector lacks funding, but mostly the requisite skills and capacity to , as a first step, determine the size of these grasslands and then finally, afforest/reforest them.
Forest conservation (Nature reserves, national parks)	Presently, there are two protected areas (Sapo National Park, East Nimba Nature Reserve) in Liberia. Three additional have been proposed and the ambition is to establish 15 of such areas in the country. However, conflict over land and promised benefits that were dashed, have encouraged encroachment in the Sapo National Park. In the case of the East Nimba Reserve, it is boundary dispute between the management of the reserve and forest-dependent communities .These protected areas were established with little or no prior consultation that was genuine and professional. Clearly, Liberia is learning hard lessons from these developments even as she work hard to bridge knowledge and capacity gaps.
Community forestry	Community forestry is mostly about putting locals in charge of forests closest to them so that the forests and their resources are managed for enhanced benefits (products) and functions (ecosystem services). Government expressed interest and willingness to include community-based forest management as another approach to forest management, in addition to the current concessionaire-driven one. The legal frame of reference for community-based forest management is the Community Rights Law with Respect to Forest Lands that is facing a confusing legislative review. We are looking forward to having a positive turn of events for this law. It is believed that the community-based forestry approach will lessen profligate use and wanton degradation of forest resources, which are an epitome of the concessionaire model. There also are equity and local resource governance issues as well. Community forestry is new in Liberia.
Forest management	Logging (timber extraction), if so designed and implemented, is a potent forest management tool. Yet, logging remains destructive, degrading and wasteful. Forest management planning – that is rooted in the principles of sustainable forest management- is lacking, including land cover mapping, multi-resource inventory ,socio-economic diagnosis, development of equations for calculating the volume of wood in standing trees, and so on. Manpower development in these and related areas is the only hope in the sector for the country.
Estimation of GHG emissions (that are associated with changes in forest & land use)	Efforts are gaining momentum on building the foundation for the sector to estimate GHG emissions. The GIS laboratory of the FDA is engaged in this type of work and is making progress here as well as a number of researchers at the Climate Change Unit of the EPA.

Recommendations for conducting the assessment of investment and financial flows

Institutional arrangements

The EPA is Liberia’s environmental management and protection watchdog. It was created in 2004 by a Legislative Act (the Act) and is mandated to coordinate, monitor and supervise environmental issues and projects. The Act also established a National Policy Council that provides policy and guidance, while formulating and coordinating policies and regulations on the environment. The EPA has a Board of Directors to oversee the implementation and successful operation of the national environment management policy and function of the EPA. The EPA, working in tandem with the National Policy Council, should create and chair an Ad Hoc Committee to, among other pertinent duties and functions assess I&FF for the proposed climate change mitigation options. Membership to this committee should be composed of individuals from the MLME, Ministry of Agriculture (MoA), the FDA, Ministry of Planning and Economic Affairs (MPEA), Ministry of Finance (MoF), National Investment Commission (NIC) and the College of Agriculture and Forestry, University of Liberia. Table 2 lists these state institutions and their current duties and functions. As one will notice after a quick review, there is overlapping of some duties and functions. It is therefore suggested that EPA convene a consultative conference with these agencies and ministries so that consensus is reached on specifics about which institution should do what and when respecting data collection and collation, creation and storage of data base, public consultation and education, and the assessment of I&FF, among others, to avoid needless competition and wasteful duplications .

Table 2.State institutions and their principal duties and functions

Institution	Major duties and functions
Ministry of Lands, Mines and Energy (MLME)	Besides its pivotal role in mineral resource development, the MLME is charged with administering and regulating private and public lands .This includes land tenure, land policy, land reform, land use planning and other aspects of land administration. It coordinates the activities of diamond miners and is responsible for issuing mining licenses. The implementation of water and sanitation is done through the Department of Mineral and Environmental Research of the Ministry, which houses both the Liberian Geological Survey (LGS) and the Liberian Hydrological Service (LHS).The LHS is responsible for collecting data on the quality, sources and quantity of water resources and is responsible for monitoring rainfall and stream flow in river basins as well as ground and surface water quality.

Ministry of Planning and Economic Affairs (MPEA)	The MPEA is responsible for regional development planning and co-ordination and the identification, development and preparation of suitable development programs and projects, both for public and private sector development. The Ministry provides technical guidance to all governmental agencies in preparation of development programs and projects and is the major stakeholder in general environmental and developmental issues and concerns .It is the formal link between implementing ministries and the international community and functions as one of the key holders of environmental data.
Forestry Development Authority (FDA)	The FDA formulates forest policies, supervises adherence to forestry legislation and concession agreements, evaluates investment proposals, carries out reforestation and forest research (including market intelligence) and training, collects revenue from forest activities and provides medium and long-term training in the forest sector.
Ministry of Finance (MoF)	The MoF manages, directs and coordinates the financial affairs of the country. It is mandated to collect revenue, engage loan arrangements, disburse government funds and service the national debt.
National Investment Commission (NIC)	The NIC is mandated by law to encourage, promote and coordinate all investment activities with the aim of accelerating growth and development.
College of Agriculture and Forestry, University of Liberia	The College of Agriculture and Forestry, University of Liberia, is a teaching and research institution for soil science, forestry, wood science and agriculture. In addition to its current curriculum, the College should include environmental management course focusing on climate change and related issues. It could be engaged to carry out climate change mitigation research and development work, in addition to forestry and agricultural research initiatives that are important to climate change.
Ministry of Agriculture (MoA)	The MoA deals with soil protection and conservation, regulation of forestry and agricultural sectors, including industrial tree plantations and animal husbandry.

Table 3. Key stakeholders and their potential roles and responsibilities

Institutions	Potential roles and responsibilities
Government institutions	Development of legal and performance management frameworks, appropriate policies and standards; provision of funds and creation of public awareness of climate change; planning and coordination of national climate change mitigation activities, and support and enforcement of international climate change mitigation initiatives
International inter-governmental institutions	Development, enforcement, monitoring and evaluation of national, regional and global climate change mitigation standards and initiatives
International financial and investment institutions	Generation and provision of funds for global climate change mitigation initiatives, and setting verifiable standards for funds (grants, loans)

(GHG mitigation offset initiatives)	
Private sector	Support for awareness creation mechanisms and investigation of climate impact; contribution to sustainable investments by matching government funds for climate change mitigation projects.
Academic and research institutions	Conduct of policy oriented research; design and testing of data collection methodologies; estimation of GHG emissions because of changes in forest land use; basic and applied research on sustainable forest management (i.e. planning, estimation of forest lands into types, expanse and trends); estimation of GHGs that are captured by various types of forests; research that matches various indigenous tree species with degraded landscapes for afforestation and reforestation purposes; accurate estimation of the volume of wood in standing trees; etc.
Ordinary citizens and the civil society	Formation of a national climate change watchdog that should participate in project preparation , and to monitor and evaluate performance of government agencies and other entities in the implementation of climate change projects; monitoring activities of illegal logging (overharvesting) and mining and other related activities that contribute to a diminishing forest cover, etc.

National sources of finance and investment for the forestry sector

The sector has a strong potential to provide a considerable percentage of what is needed in finances to reduce deforestation and forest degradation. But as this document shows or attempts to demonstrate at its core, forest management practices remain destructive, unregulated, and the main product of the sector, wood, is grossly wasted and undervalued in a variety of ways. The resulting level of environmental degradation will definitely continue to be high as long as high societal needs are combined with low technological advancement and insufficient control. Resource governance issues and competent management skills remain the sector’s formidable challenges. There also is the mindset in this sector that Liberia simply cannot stop the practice of transfer pricing and almost total log export, because it lacks the ability to establish industries capable of producing quality finished products, hence must rely almost entirely on international lending agencies and goodwill for its future. Gross mismanagement of the resource and the syndrome of helplessness have kept forestry far from taking the lead it should towards improved living standards and healthy environment for more than 50 years before the war. Under these and a host of related circumstances, the sector must identify local financing mechanisms and attract private sector investment, primarily outside its borders, to promote the transition to and growth of mitigation and adaptation to climate change. Specifically, the sector is plagued with the same financing and investment problems as the nation when it comes to the challenges a changing climate poses. Few key examples:

- Liberia’s HIPC (Heavily Indebted Poor Country) status. Liberia has lost its credibility with both bilateral and multilateral donor partners for not being credit worthy. The Government is tackling this difficulty by buying back

commercial debt at a discount rate of nearly 97% of the face value, among others. Limitations of crediting opportunities are an impediment to investment and financing.

- Fear of potential threats to peace. Donors do have legitimate reservation to invest in a country 'snailing' its way out of a senseless, self-inflicted war that lasted for more than 14 years.
- The disadvantage with attracting investors and financiers (private, public) to support the proposed options whose implementation will largely be experimental. Clearly, an entirely new financing and investment vehicles, such as carbon offset trades, have their own inherent financial technology risk because the underlying financing mechanism is new and unproven.
- The need for measures beyond expansion of crediting mechanisms. Liberia has conditions that make investment extremely difficult. The measures in point are needed to attract investors and financiers and could include direct financial support for certain mitigation measures such as renewable energy generation (hydropower), as well as financial support for national policies, such as implementation of efficiency standards. International public finance can play an important role in realizing the above, and also in leveraging private finance. Public finance may also fund research, development and early deployment of technologies that will open up new and potentially cheaper mitigation opportunities in Liberia, such as the establishment of hydro power plants.

Government funding for the sector

In spite of the above challenges and shortcomings, the government has funded the FDA's activities for 3 consecutive years, including this year. In the fiscal year of 2007 (July 1 2006-June 30 2007), the FDA received USD 2,640,000.00 and in 2008 (July 1 2007-June 30 2008), USD2, 993,000.00. For 2009 (July 1 2008-June 30 2009), the government provided USD3,240,000.00.³⁷ Foreign assistance to the FDA is currently not very significant. Assistance mainly comes in the form of foreign travel tickets and daily subsistence allowances to pay for staff to attend workshops, conferences and short-term training courses abroad. However, a few consultants have been seconded to carry out short-term consultancy work (about four individuals since 1997). The FDA does not receive any grants or subsidies from domestic source, but benefits from the Society for the Conservation of Nature of Liberia (SCNL)

Supported by CI and the World Wildlife Fund. These grants are used for the assessment of the status of Sapo National Park, with the aim of producing a comprehensive management plan for the area.³⁸ There also are grants that come as technical assistance to the FDA from USAID, Fauna and Flora International and IUCN.

³⁷ Based on the Ministry of Finance Reports (<http://www.mof.gov.lr>). Monrovia, Liberia.

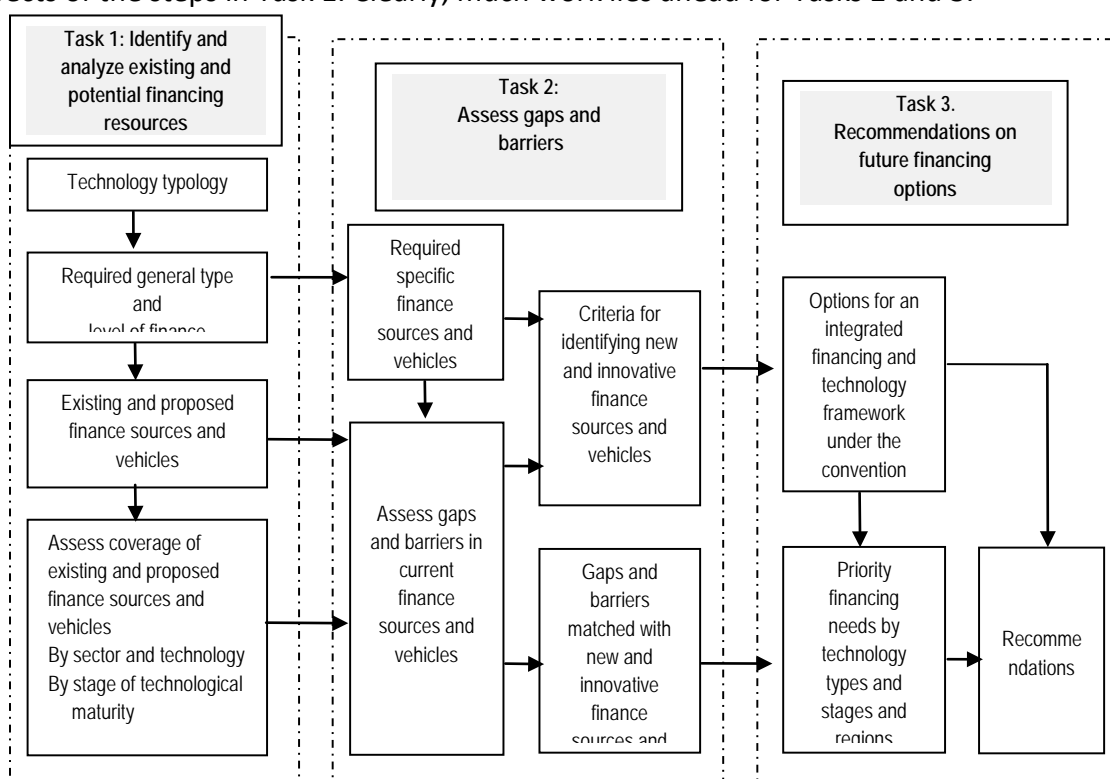
³⁸ Based on FAO.2007. Government expenditure on forestry (<http://www.fao.org/docrep/007/ad49e/AD49E.09.htm>).

The path to attracting international funding opportunities

At present, this sector and Liberia as a whole cannot unilaterally fund climate change mitigation activities; certainly not under the forest use and management practices described, but this nation could attract funding by:

- Educating capital markets about the investment opportunities in climate change mitigation technologies
- Packaging and structuring these opportunities in ways which are easily understood and recognized by private sector investors
- Reducing risks and incremental costs specific to this emerging industry
- Measurable, reportable and verifiable (MRV) support will be key to an international mechanism to support mitigation action in Liberia.

The diagram below provides the three key types of activities that must be undertaken in the quest for finances. So far, what has been accomplished in Liberia covers some aspects of the steps in Task 1. Clearly, much work lies ahead for Tasks 2 and 3.



Source: UNFCCC. 2008. Identifying, analyzing and assessing existing and potential new financing resources and relevant vehicles to support the development, deployment, diffusion and transfer of environmentally sound technologies. Interim report by the Chair of the Expert Group on Technology Transfer. FCCC/SB/2008/INF.7.

A brief description of international sources for financing and investment flows

In spite of its HIPC status, Liberia has received multilateral (and to some extent bilateral) funding from a number of its international partners – notably the USAID, UNDP, EC, and the World Bank - to enable implementation of all the climate change mitigation and adaptation activities listed in this brief (see sections 1.2, 2.3, 2.4). Only in few instances had the government contributed and this has largely been in-kind. Following are three potential sources for bilateral and multilateral financing and investment flows:

- **CDM.** What is particularly important for Liberia is the fact that most of the investment in CDM projects involves hydropower (this is an area where Liberia has a huge advantage, especially if she can craft a forest management regime to identify and rehabilitate her watersheds to strengthen and sustain their functionality) and other clean technology such as wind, fossil fuel switching, biomass energy and energy efficiency industry. The total capital that was expected to be invested in CDM projects in June 2008 was estimated at USD 94.7 billion (including some projects that are in the validation stage and are highly unlikely to proceed).³⁹
- **REDD.** There are two funding sources here: (a) The Norwegian Climate and Forest Initiative (NCFI). In August 2008, the Norwegian Government declared its willingness to provide up to USD600million annually towards efforts to reduce emissions from deforestation and forest degradation in developing countries. This assistance is either bilateral – if national capacity for monitoring, reporting and verification is good – such as in Brazil and Tanzania, two tropical countries that have been funded, USD100million each, by this Initiative⁵². Discussions are taking place between this Initiative and the Governments of Papua New Guinea and Indonesia for funding. In April, representatives from the Initiative held several meetings with a range of stakeholders in government, NGOs, etc in Liberia to explore the nation's REDD readiness and financing possibilities; (b) The World Bank Forest Carbon Partnership Facility (FCPF) has earmarked USD250million for REDD readiness activities and pilots.⁴⁰

³⁹ Fenhann, J. 2008. Overview of the CDM pipeline (<http://cdmpipeline-org/publications/CDMpipeline.xls>, Seres, S. 2007. Analysis of technology transfer in CDM projects. Report to the UNFCCC projects. Report to the UNFCCC Registration and Issuance Unit

⁴⁰ Richards, M. and Jenkins, M. 2007. Potential and challenges of payments for ecosystem services from tropical forests. Forestry Briefing. Overseas Development Institute, United Kingdom.

References

A/R CDM approved methodologies

(http://cdm.unfccc.int/ARmethodologies/approved_ar.html) Ministry of Finance Reports (<http://www.mof.gov.lr>). Monrovia, Liberia. FAO.2007. Government expenditure on forestry (<http://www.fao.org/docrep/007/ad49e/AD49E.09.htm>).

Blaser, J. & Dagbe, B.V. 2008. Assessment of the current status of the forest sector in Liberia and identification of priority needs for development assistance through ITTO project activities .FDA/ITTO/Intercooperation.

Blaser, J. & Robledon,C.2009. Methodology guidebook for the assessment of investment flows to address climate change (Version 1.0).

Blundell, A.G., Bodian, A., Callamand, D, Fithen, C. & Garnett, T.2003.UN Report on the Impact of Timber sanctions on Liberia. UN Security Council Document S/2003/779 & 973.

Blundell.2007.UN Report on compliance with UN sanctions on Liberia. UN Security Council Document S/2007/374.

Blundell, A. G. 2008. On the benefits of incorporating forestry into the extractive industries transparency initiative, with specific reference to Liberia.

Bowen-Jones, E.& Pendry,S. 1999. The threat to primates and other mammals from the bushmeat trade in Africa, and how this threat could be diminished. *Oryx*, 33(3):233-246.

Brown, S., Maserea, O. & Sathaye,J.2000.Project- based activities. In: R. T. Watson, I. R. Noble, B. Bolin, N. H. Ravindranath & D. J. Dokken (eds.).Land use , land-use change and forestry: A special report of the IPCC, Cambridge, United Kingdom. Cambridge University Press.

CBL.2000. Annual Report 2000. Central Bank of Liberia, Monrovia.

Davis, C. 2008. Protecting forests to save the climate: REDD challenges and opportunities. *Earth Trends Update*, April 2008.

Drakenberg, O. 2008. Draft Liberia environment and climate analysis. School of Economics and Commercial Law, Environmental Economics Unit. Goteborg University, Sweden.

EPA. 2007. Inventory of GHG emissions of the energy sector of Liberia. Monrovia.

FAO. 1983. Forest revenue systems in developing countries. FAO Paper No.43.Rome.

- FAO. 2005. Global forest resources assessment 2005. Progress towards sustainable forest management. FAO Forestry Paper 147.
- FDA.2000.Annual Report. Forestry Development Authority.
- FDA. 2006. National forestry policy and implementation strategy. Monrovia.
- FDA. 2009. A road map: Alternatives to commercial logging in Liberia – a policy guideline for consideration .Forestry Development Authority, March 2009.
- Fenhann, J. 2008.Overview of the CDM pipeline (<http://cdmpipeline.org/publications/CDMpipeline.xls>).
- Garnett, D. & Utas, C.2000.The Upper Guinea Heritage: Nature conservation in Liberia and Sierra-Leone. IUCN, Amsterdam, The Netherlands.
- GoL.2006.Interim poverty reduction strategy: Breaking with the past-from conflict to development. Government of Liberia.
- Grut, M., Gray, J. W. & Egli, N. 1991. Forest pricing and concession policies: Managing the high forests of West Africa and Central Africa. World Bank Technical Paper No.143.Washington, DC., World Bank.
- Hoogeveen, H. Forests and climate change: From complex problem to integrated solution. UN Chronicle Online Editions (<http://www.un.org/Pubs/chronicle/2007/issue2/0207p36.htm>).
- ICRAF. 1998. Medium-term plan 1998-2000.International Centre for Research in Agroforestry/World Agroforestry Centre. Nairobi.
- Jaeger, C. C., Renn, O., Rosa, A. E. & Webler, T.1998. Decision analysis and rational actions. In: Human Choice and climate change, tools for policy analysis, 3:141. Battelle Press, Columbus.
- Kramer. & Mercer, D.E.1997. Valuing a global environment good: U.S.residents' willingness to pay to protect tropical rainforests. Land Economics, 73(May):196-210.
- Kryn, J. M. & Fobes, E.W.1959. The woods of Liberia. Forest Products Laboratory & Forest Science. US Department of Agriculture. Report No.2159.
- Lasco, R. D., Pulhin, F. B., Roshetko, J. M. & Banaticla, M.R.N.2004.LULUCF climate change mitigation projects in the Philippines: A primer. World Agroforestry Center.

- Leakey, R. R. B. 1996. Definition of agroforestry revisited. *Agroforestry Today*, 8:5-7.
- Libbie, A.R.1998.The No.2 River Forest Reserve, and Sierra Leone: Managing for biodiversity and the promotion of ecotourism .Report submitted to UN Project No.SIL/93/002.
- Methot, P, Appiah, S., Simpson. & Sio, F.K. 2005.Timber and the rebuilding of Liberia. *Tropical Forest Update*, 15(3):3-6.
- Moura-Costa, P.1996.Tropical forestry practices for carbon sequestration. In: A. Schulte & D. Schione (eds.).*Dipterocarp forests ecosystems: Toward sustainable management*. Singapore: World Scientific.
- NAPA. 2008. Liberia National program of action (NAPA).GoL/GEF/UNEP.
- NCFI. 2009. Introduction to the Norwegian climate and forest initiative (<http://www.norwaay.or.id/policy/environment/introforest.l.htm>).
- Perrings, C. 1995. Biodiversity conservation as insurance. In: *The Economics and Ecology of Biodiversity Decline*, p.69-78.T.Swanson (ed.).Cambridge: Cambridge University Press.
- Quansah, C. 2008. An overview of non-timber forest products with good potential for promotion in Liberia. A report submitted to Forest Trends, Washington, and DC.USA.
- Richards, M. and Jenkins,M. 2007. Potential and challenges of payments for ecosystem services from tropical forests. *Forestry Briefing 16*. Overseas Development Institute, United Kingdom.
- Rochow, K.W.J., Simpson, R., Brownell,R.,Pierson,O.2006.The Liberian concession review: Lessons for resource management and restoration of the rule of law. *Journal of Peacekeeping and Development*,3:89.
- Schlesinger,W. H. 1997. *Biogeochemistry: an analysis of global change*. Academic Press, San Diego.
- Seres, S. 2007. Analysis of technology transfer in CDM projects. Report to the UNFCCC projects. Report to the UNFCCC Registration and Issuance Unit.
- Stern, N. 2006. *Stern review: The economics of climate change*. Cambridge University Press, Cambridge, United Kingdom.
- UNDP. 2006. *First state of the environment report for Liberia*.Monrovia.

United Nations Development Programme climate change profiles: Liberia ([http://country profiles.geog.ox.ac.uk](http://countryprofiles.geog.ox.ac.uk)).

UNFCCC. 2006. Background paper for the workshop on reducing emissions from deforestation in developing countries. Working Paper No.1.

USEmbassy. 2008. Doing business in Liberia. Economic/Commercial Section, United States Embassy. Monrovia, Liberia. August 2008.

Unruh, J.D., Houghton, R.A. & Lefebvre, P.A.1993. Carbon storage in agroforestry: An estimate for sub-Saharan Africa. *Climate Change*, 3:39-52.

Watson, R. I., Noble, I., Boliner, B. et al. 2000. IPCC Special Report on Land Use, Land-use Change and Forestry. Cambridge, IPCC:377.

Wiles, D. L. 2005. Coastal zone vulnerability and adaptation to climate change in Liberia. Paper presented at the Training Workshop on Adaptation and Vulneration to Climate Change, Maputo, Mozambique, and 18-21 April 2005.

World Bank. 2008. Liberia: Consolidation of Liberia protected area network (COPAN). Washington DC, USA.

Young, O. 1998. ssssssssInstitutional dimensions of global environmental change. International human dimensions programme, Report No.9, IHDP.