

# Building capacity for REDD+ planning in Liberia

## Training agenda

Monrovia, 13 - 16 February 2018

## Background

Liberia has approximately 4.3 million hectares of lowland tropical forest that constitutes 43% of the remaining Upper Guinean Forests of West Africa and is rich in endemic species. Liberia's forest cover provides direct benefits that include wildlife habitat, ecotourism industry, soil conservation and sustainable agriculture, protection of water resources and availability of non-timber forest products to the local communities, 67% of which live below the poverty line. This critical natural capital is now threatened by several drivers of deforestation and forest degradation; the main one, as indicated in Liberia REDD+ national strategy, are shifting agriculture, pit sawing, charcoal production, palm oil concessions, forestry concessions (mostly for timber sales) and mining exploration.

In order to avoid the loss of Liberia's unique and biodiversity-rich forest and reduce greenhouse gas emissions from deforestation in September 2014, Liberia and Norway entered into a partnership to support the development and implementation of Liberia's REDD+ strategy, contribute to sustainable development through protecting natural forests, restoring degraded lands and developing agricultural sector, and work to support progress on global efforts regarding climate change, sustainable development and REDD+. Norway will support Liberia's efforts with up to NOK 1 billion until 2020. In December 2015, Norway (NICFI/NORAD) signed an agreement worth NOK 50 million with IDH to support IDH's landscape programme in three countries including Liberia, Indonesia and Brazil to help delink commodity production from deforestation. As part of this effort, Liberia launched the public-private cooperation to improve livelihoods and protect forests in March 2016.

In addition to the direct support given by Norway, Liberia will benefit from UN-REDD technical assistance provided under the project: "UN Environment in UN-REDD: Tools and approaches to support countries in incorporating multiple benefits, green economy and green investments in REDD+ planning".

A scoping mission to Liberia in May 2017 identified a demand for technical capacity building amongst an existing network of GIS professionals working in and alongside the Forest Development Authority of Liberia. Through the UN-REDD Programme, the UN Environment World Conservation Monitoring Centre (UNEP-WCMC) will organise two such capacity-building sessions in 2018 that will involve colleagues from several Liberian institutions, as a contribution to meeting national needs in relation to REDD+ national strategy finalization and implementation.

The strategic priorities identified in the REDD+ national strategy and the drivers of deforestation and forest degradation identified in the same document, will be utilized to build spatial workflow that can be used to inform the implementation of REDD+ future spatial planning.

## Objectives

The overall objective of these training sessions is to enable the integration of multiple benefits in REDD+ spatial planning in Liberia, by building technical capacity of key national GIS staff on data analysis and mapping using the open-source GIS software QGIS.

Specific learning objectives for the first session are:

1. Developing and analysing spatial information to support REDD+ planning at the national scale, with a focus on the multiple benefits provided by forests, as well as mapping pressures on these ecosystems.
2. Learning how QGIS software and other GIS based tools can be used to carry out analyses on baseline hydrology and water resources as well as on the potential impacts of land use, land management and climate change.
3. Learning how to combine benefits layers and to identify priority areas where to implement REDD+ interventions. Particular attention will be given to the exploration of different ways of combining and presenting the output layers, and of the likely contrasting results determined by the use of different thresholds and indices.
4. Understanding and setting priorities for future analysis on the multiple benefits for forests at the national scale.

The second session will build on the outputs produced during the first session and will develop the participant's capacity to build spatial workflows to identify priority areas for REDD+ implementation. The second session will also focus on creating effective maps for decision makers, for example by using matrix style legends, which helps to visualize the relationships between two datasets.

## Date and location

The workshop will take place from the 13<sup>th</sup> to the 16<sup>th</sup> of February 2018 at Corina Hotel (26 Street Tubman Boulevard - Monrovia).

## Participants

The event is targeted at participants who are actively involved in work on REDD+ and spatial analysis. The Forestry Development Authority (FDA) will develop a list of participants based on their involvement in national REDD+ spatial planning.

A survey before the session will be conducted to assess training needs in more detail and confirm the suitability of participants.

The event is designed to cater for up to 18 participants, working in pairs.

## Organisers

Thais Narciso ([thais.narciso@unep.org](mailto:thais.narciso@unep.org)) – country focal point for UN Environment

Barbara Pollini ([Barbara.pollini@unep-wcmc.org](mailto:Barbara.pollini@unep-wcmc.org)) – lead trainer, based at UN Environment World Conservation Monitoring Centre

## Agenda

### Session 1: Technical workshop on spatial analyses to support national REDD+ planning and introduction to QGIS

Time	Topic and activity	Presenter/facilitator
<b>13<sup>th</sup> February: Introduction to QGIS</b>		
08:30-09:00	Registration and receive material	
09:00-09:15	Welcoming regards	
09:15-09:30	Introduction and icebreaker	
09:30-10:00	Objectives of the week, agenda and discussion of expectations	
10:00-10:30	Presentation: Role of spatial information in supporting REDD+ planning and overview of spatial analyses tools available to support this process	
10:30-10:40	Q&A	
10:40-11:00	<b>Tea/coffee break</b>	
11:00-11:30	Distribution of USB sticks, and checking QGIS installation	
11:30-12:00	Presentation: Introduction to QGIS and exploration of QGIS interface	
12:00-12:20	Exploration of the data available from different sectors	
12:20-13:00	Group discussion and report back on the data available for Liberia	
13:00-14:00	<b>Lunch</b>	
14:00-15:30	Tutorial: Introduction to QGIS. The tutorial includes a series of exercises and steps to practice <i>This tutorial will introduce QGIS and will show how it can be used to undertake spatial analysis relevant to REDD+ interventions.</i>	
15:30-15:45	Tea/coffee break	
15:45-17:00	Continue working on the QGIS tutorial	
<b>14<sup>th</sup> February: Mapping multiple pressures on forests</b>		
08:30-09:30	Continue working on the QGIS tutorial if necessary	
09:30-10:00	Presentation: Mapping forests and their current and future deforestation and degradation drivers	
10:00-10:30	Group discussion: Definition of forest and what data from different sectors can inform the development of maps showing current and future drivers of deforestation and forest degradation as identified in Liberia REDD+ national strategy	
10:30-10:50	<b>Tea/coffee break</b>	
10:50-11:00	Introduction to exercise on drivers: working in pairs the participants after having identified the GIS layers that can be used to map drivers, will overlay those with the forest-cover layer. <i>This exercise aims to help understanding where</i>	

	<i>different drivers are occurring now and in the future and where there may be spatially explicit barriers to implement a measure for conservation, sustainable management and forest enhancement.</i>	
11:00-13:00	Exercise on pressures	
13:00-14:00	<b>Lunch</b>	
14:00-14:40	Report back	
14:40-15:30	Group discussion: How can the analyses on deforestation and forest degradation drivers can be combined with other data or proxies if the factors are not directly spatially explicit (such as political decision, technological advancements, etc.)	
15:30-15:50	<b>Tea/coffee break</b>	
15:50-16:10	Presentation: Overview of benefits and risks of REDD+	
16:10-16:55	Group exercise on reviewing the benefits and risks of REDD+ implementation in Liberia identified in the SESA developed in 2016 for the country, identifying new ones and exploring monitoring options	
16:55-17:15	Report back from exercise on risks and benefits	
<b>15<sup>th</sup> February: Multiple benefits</b>		
08:30-08:45	Recap of previous day	
08:45-09:00	Presentation: What spatial data can be used for mapping benefits	
09:00-09:30	Group exercise/discussion: Identifying benefits and what spatial data would you use to map them	
09:30-09:50	Report back: What are the 3 key benefits identified and which spatial data would you use to map them	
09:50-10:00	Presentation: introduction to the species richness tutorial	
10:00-10:20	<b>Tea/coffee break</b>	
10:20-13:00	Exercise on species richness <i>In this activity, workshop participants will use IUCN Red List data and other relevant datasets to identify areas where REDD+ activities could deliver highest biodiversity benefits in Liberia</i>	
13:00-14:00	<b>Lunch</b>	
14:00-14:30	Presentation: Mapping the importance of forest for water supplies and soil erosion mitigation	
14:30-15:30	Exercise: Mapping forest hydrological services <i>Participants will use outputs from hydrological analyses to produce maps showing the importance of forests for hydrological services (water provision and soil erosion) to end users.</i>	
15:30-15:45	Tea/coffee break	
15:45-17:00	Continue on exercise	
15:20-17:00	Continue mapping forest hydrological services	
<b>16<sup>th</sup> February: Combining forest benefits and pressures for the implementation of REDD+</b>		
08:30-08:45	Recap of previous day	

08:45-09:00	Presentation: Different ways of combining and presenting multiple benefits and pressures layers for the implementation of REDD+ interventions	
09:00-10:00	Exercise on spatial analyses techniques to combine layers produced on the previous days <i>In this activity the participants will explore different ways of combining and presenting the output layers to identify priority areas</i>	
10:00-10:20	<b>Tea/coffee break</b>	
10:20-12:00	Continue exercise on spatial analysis techniques to combine layers	
12:00-13:00	Report back on the exercise	
13:00-14:00	<b>Lunch</b>	
14:00-14:30	Presentation: Introduction to spatial workflow	
14:30-15:30	Group discussion: What are the criteria needed to identify priority areas for REDD+ interventions in Liberia, based on Liberia strategic priorities for REDD+, and what are the spatial steps you would use?	
15:30-15:50	<b>Tea/coffee break</b>	
15:50-16:30	The participants will give a 5 minute presentation of their proposed workflow	
16:30-17:00	Wrap up session: - Discussion of next steps and list of layers to be prepared by the participants for session 2 - Evaluation forms - Closing remarks	

## Outline for session two: Technical workshop on the use of spatial workflows to support national REDD+ planning

Day	Topic
<b>Day 1</b>	<ul style="list-style-type: none"> <li>- Review of the workflow approach to answer specific questions on how to prioritise areas for REDD+ interventions.</li> <li>- Review of the questions and layers prepared by the participants to be used during the training.</li> <li>- Tutorial on QGIS Graphical modeller to analyse the workflow.</li> </ul>
<b>Day 2</b>	<ul style="list-style-type: none"> <li>- Continue tutorial on QGIS Graphical modeller to analyse the workflow.</li> <li>- Use QGIS graphical modeller to build spatial models to answer the specific questions on how to prioritise areas for REDD+ interventions.</li> </ul>
<b>Day 3</b>	<ul style="list-style-type: none"> <li>- Use QGIS graphical modeller to build spatial models to answer the specific questions on how to prioritise areas for REDD+ interventions.</li> <li>- Tutorial on designing map templates that can effectively communicate to policy makers</li> </ul>
<b>Day 4</b>	<ul style="list-style-type: none"> <li>- The participants prepare presentations on the results from the spatial analysis conducted in day 2 and 3</li> <li>- Presentations to the GIS/working group</li> </ul>
<b>Day 5</b>	<ul style="list-style-type: none"> <li>- Report back and discuss further steps</li> <li>- Wrap up session</li> </ul>

## Annex: GIS layers available

Topic	Dataset name	Data type	Source
<i>Land cover/Land use</i>	Liberia land cover	Raster tif	- JV Metria/Geoville. 2015. Liberia Land Cover and Forest Mapping 2015. JV Metria/Geoville and Forestry Development Authority, Monrovia, Liberia. - Provided by Conservation International
	Tree cover loss (2000-2015)	Raster tif	- JV Metria/Geoville. 2015. Liberia Land Cover and Forest Mapping 2015. JV Metria/Geoville and Forestry Development Authority, Monrovia, Liberia.; - Hansen, M. C., P. V. Potapov, R. Moore, M. Hancher, S. A. Turubanova, A. Tyukavina, D. Thau, S. V. Stehman, S. J. Goetz, T. R. Loveland, A. Kommareddy, A. Egorov, L. Chini, C. O. Justice, and J. R. G. Townshend. 2013. "High-Resolution Global Maps of 21st-Century Forest Cover Change." Science 342 (15 November): 850–53 - Provided by Conservation International
	Forest cover loss (1990-2000)	Vector polygon shapefile and Raster tif	- Center for Applied Biodiversity Science (CABS) at Conservation International (CI), Fauna & Flora International (FFI). 2007. Liberia Forest Cover and Clearance for ~1990 to ~2000. Arlington, VA: CABS. - Provided by Conservation International
	Land cover Liberia	Vector polygon shapefile	Forestry Development Authority
<i>Administrative</i>	Liberia boundary	Vector polygon shapefile	Conservation International
	Clans of Liberia	Vector polygon shapefile	Forestry Development Authority
	Counties of Liberia	Vector polygon shapefile	Conservation International
	Districts of Liberia	Vector polygon shapefile	Forestry Development Authority
<i>Biodiversity</i>	Chimpanzee occurrence	Vector polygon shapefile	IUCN 2014. The IUCN Red List of Threatened Species. Version 2014.1. <a href="http://www.iucnredlist.org">http://www.iucnredlist.org</a>

	KBA_IBA	Vector polygon shapefile	BirdLife International and Conservation International (August 2010). Key Biodiversity Areas (KBAs) - including Important Bird Areas (IBAs) maintained by BirdLife International and Key Biodiversity Areas maintained by Conservation International. BirdLife International, Cambridge, UK and Conservation International, Washington DC, USA.
	Amp, Aves, Mamm, Rept species relevant for Liberia	Vector polygon shapefile	IUCN 2016. The IUCN Red List of Threatened Species. Version 2016.3. <a href="http://www.iucnredlist.org">http://www.iucnredlist.org</a>
<i>Carbon</i>	AGB_Avitabile	Raster tif	Avitabile, V., Herold, M., Heuvelink, G. B. M., Lewis, S. L., Phillips, O. L., Asner, G. P., Armston, J., Ashton, P. S., Banin, L., Bayol, N., Berry, N. J., Boeckx, P., de Jong, B. H. J., DeVries, B., Girardin, C. A. J., Kearsley, E., Lindsell, J. A., Lopez-Gonzalez, G., Lucas, R., Malhi, Y., Morel, A., Mitchard, E. T. A., Nagy, L., Qie, L., Quinones, M. J., Ryan, C. M., Ferry, S. J. W., Sunderland, T., Laurin, G. V., Gatti, R. C., Valentini, R., Verbeeck, H., Wijaya, A. and Willcock, S. (2016), An integrated pan-tropical biomass map using multiple reference datasets. <i>Glob Change Biol</i> , 22: 1406–1420. doi:10.1111/gcb.13139
	Forest Carbon (2015)	Raster tif	- Avitabile, V., Herold, M., Heuvelink, G. B. M., Lewis, S. L., Phillips, O. L., Asner, G. P., Armston, J., Ashton, P. S., Banin, L., Bayol, N., Berry, N. J., Boeckx, P., de Jong, B. H. J., DeVries, B., Girardin, C. A. J., Kearsley, E., Lindsell, J. A., Lopez-Gonzalez, G., Lucas, R., Malhi, Y., Morel, A., Mitchard, E. T. A., Nagy, L., Qie, L., Quinones, M. J., Ryan, C. M., Ferry, S. J. W., Sunderland, T., Laurin, G. V., Gatti, R. C., Valentini, R., Verbeeck, H., Wijaya, A. and Willcock, S. (2016), An integrated pan-tropical biomass map using multiple reference datasets. <i>Glob Change Biol</i> , 22: 1406–1420. doi:10.1111/gcb.13139; - MOKANY, K., RAISON, R. J. and PROKUSHKIN, A. S. (2006), Critical analysis of root: shoot ratios in terrestrial biomes. <i>Global Change Biology</i> , 12: 84–96. doi:10.1111/j.1365-2486.2005.001043.x - Conservation International. 2017. Natural Capital Mapping and Accounting in Liberia: Understanding the contribution of biodiversity and ecosystem services to Liberia’s sustainable development. Arlington, VA.
	Total Biomass	Raster tif	Saatchi S, Harris NL, Brown S, Lefsky M, Mitchard ET, Salas W, Zutta BR, Buermann W, Lewis SL, Hagen S, Petrova S, White L, Silman M, Morel A. (2011). Benchmark map of forest carbon stocks in tropical regions across three continents. <i>Proc Natl Acad Sci U S A</i> . 2011 Jun 14; 108(24):9899-904.
	AGB	Raster tif	
	BGB	Raster tif	
<i>Hydrology</i>	Liberia rivers	Vector line shapefile	FFI
	Liberia rivers	Vector line shapefile	Conservation International
	Liberia rivers	Vector line shapefile	WCMC
<i>Infrastructures</i>	Existing small dams	Vector point shapefile	- Ministry of Lands, Mines and Energy- MLME, 2013. Liberia Investment Plan for Renewable Energy. Rural and Renewable Energy Agency. Ministry of Lands, Mines and Energy, Republic of Liberia
	Planned dams	Vector point shapefile	- Provided by Conservation International
	Roads	Vector line shapefile	- Provided by Conservation International - OpenStreetMap; U.S. National Geospatial Intelligence Agency (NGA), 2014, dataset: LBR_Roads_NGA_20160708.shp. Source, S2, Content Management Office (SD), Geospatial Data Steward, NIPR: CMOServiceEnableTeam@nga.mil
	Mount coffee dam	Vector point shapefile	Conservation international

	Paved and unpaved roads	Vector line shapefile	Forestry Development Authority
	Railway	Vector line shapefile	
<i>Natural capital</i>	Sediment regulation	Raster tif	Conservation International. 2017. Natural Capital Mapping and Accounting in Liberia: Understanding the contribution of biodiversity and ecosystem services to Liberia's sustainable development. Arlington, VA.
	Natural ecosystems accessible to people	Raster (8 bit – unsigned integer)	
	Coastal protection	Vector point shapefile	
	Freshwater provision (40%)	Raster (8 bit unsigned integer)	
	Freshwater provision (30%)	Raster (8 bit unsigned integer)	
	Realized freshwater provision	Raster floating point	
	Flood regulation	Raster floating point	
<i>Pressures</i>	Timber concessions	Vector polygon shapefile	- Provided by Conservation International - Government of Liberia (GoL) (2003). National Biodiversity Strategy and Action Plan. Government of Liberia.
	Palm oil concessions	Vector polygon shapefile	Conservation International. 2017. Natural Capital Mapping and Accounting in Liberia: Understanding the contribution of biodiversity and ecosystem services to Liberia's sustainable development. Arlington, VA.
	Rubber concessions	Vector polygon shapefile	
	Mining concessions	Vector polygon shapefile	
	Mining exploration licenses	Vector polygon shapefile	
	Mining sites	Vector point shapefile	Forestry Development Authority

	Youssef diamond mining	Vector polygon shapefile	Forestry Development Authority
<i>Protected areas</i>	Protected areas	Vector polygon shapefile	IUCN and UNEP-WCMC (2016), The World Database on Protected Areas (WDPA) [On-line], Cambridge, UK: UNEP-WCMC
<i>Socio-economic</i>	Commercial areas	Vector polygon shapefiles	FFI
	Community areas		
	High population density areas	Vector polygon shapefile	WCMC
	Human population centres	Vector point shapefile	- LISGIS (2009). National Population and Housing Census 2008. Liberia Institute of Statistics and Geo-Information Services (LISGIS). - Provided by Conservation International
	Main population centres		
	Populated places (2004)	Vector point shapefiles	Forestry Development Authority
Populated places (2007)			
<i>Vulnerability</i>	Coastal vulnerability	Vector point shapefile	Conservation International. 2017. Natural Capital Mapping and Accounting in Liberia: Understanding the contribution of biodiversity and ecosystem services to Liberia's sustainable development. Arlington, VA.
	Deforestation vulnerability	Raster (Floating point)	
	Flood vulnerability	Raster (16 Bit integer)	- UNEP (2009) 2009 Global Assessment Report on Disaster Risk Reduction: Risk and poverty in a changing climate - Provided by Conservation International