An Open-Source Methodology for Tracking Natural Resource Concessions in Liberia

Version 1.0

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Special Thanks

Introduction

The Ellen Johnson-Sirleaf administration has made natural resource concessions a key part of Liberia's economic growth strategy. It has granted somewhere between 21% and 38% of the country's land to investors in the hopes that they will stimulate economic activity in the agriculture and mining sectors, increase employment in rural areas, and build and maintain infrastructure (AFDB 2013). However, it remains unclear if this FDI-led growth strategy produces broad-based economic development benefits. In order to further research the conditions by which natural resource concessions contribute to Liberia's economic growth, we have developed a geo-referenced database of more than 500 concession licenses in Liberia between 2004 (the end of the Liberian civil war) and 2015. Each license is geo-referenced as a polygon with more than 40 attributes, making this database a first-of-its-kind application of using open-source methods to comprehensively track, capture, and locate activities in the extractives sector. This methodology describes the data collection and geo-referencing process for this database in detail.

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Section 1: Overview of Data Collection and Sourcing

We sourced information on concession contracts from four main sources: (1) Contracts/Agreements from the LEITI; (2) the Ministry of Lands, Mines, and Energy's (MLME) Mining Cadastre Administration System (MCAS); (3) the National Bureau of Concessions' Liberia National Concession Portal (LNCP); and lastly, (4) third-party information obtained from open-source searches and discussions with stakeholders in Liberia during a one-week visit and two-day training workshop with members of the Concessions Working Group (CWG). Table 1 below breaks down key characteristics and the coverage of the first three sources, with the fourth being contingent on access to resources:

Table 1: Coverage of Sources

Source	Format	Sector	Historical Coverage	Access	Geographic Information
LEITI	Scanned PDFs	Agriculture, Forestry, Mining, Hydrocarbons	Yes	Available on LEITI's website	Yes - see **Section 3**
MCAS	Database	Mining	Yes	Available on MLME's website (registration required)	Yes - downloadable spatial information
LNCP	Web-Map	Agriculture, Forestry, Mining, Hydrocarbons	No	Accessible via web-map on FlexiCadastre	Yes - downloadable spatial information

Concession contracts from LEITI - more than 100 total - served as the baseline for data collection. These long, unstructured, scanned contracts contain rich information about the contract's attributes, ranging from baseline information about the contract to special provisions, restrictions, and agreements by which the concessionaire must abide as part of the contract negotiation and execution process. We describe these attributes more in detail in **Section 2**. The process of data collection consisted of research assistants scanning the contract for key attribute details, copying the raw information into relevant columns in a spreadsheet, and then undergoing extensive quality assurance to render the information more accurate and presentable for users.[1] Research assistants then conducted open-source searches, using news reports, university library databases such as Factiva, business resources, and other sources of third-party information in order to uncover additional details for key attributes[2]. This process, often broken into two discrete steps, yielded fruitful results in terms of the number of licenses and attributes covered. Research assistants also collected the extent of geographic information available for a concession agreement from each LEITI contract, a process described more in detail in **Section 3**. Table 1 in **Appendix A** details the type of licenses collected from LEITI.

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[1] This methodological note does not describe a step-by-step approach for collecting data from these contracts, as they are often unstructured and vary in length. However, research assistants used section headers and context clues to arrive at a consistent, replicable method for collecting information from different contracts into attribute fields in a spreadsheet. Each row in the spreadsheet was scrutinized by at least 3 different research assistants and a member of AidData staff during the quality assurance process prior to publication.

[2] One such attribute is the financial amount committed by a concessionaire for activities in a concession area. This information is not readily available in contract details but is often reported by local sources.

Following this initial round of data collection, AidData obtained access to two key sources of concessions data: the MCAS and LNCP. The MCAS represented a comprehensive effort[3] to track mining licenses and concessions allocated by the government historically. Table 2 in **Appendix A** details the granular categories of mining licenses that we collected from the MCAS to either supplement or match with our existing data. By being able to download both the attribute and spatial information for each license from the MCAS, we more than doubled the number of concession licenses included in our initial database without much more raw data collection.[4]

In a third round of data collection, we collected attribute and spatial information from the LNCP, which contained a snapshot of all active concession agreements across all sectors.[5] The LNCP allowed us to not only further vet our data with information from a leading government source on concessions monitoring, but it also contained highly accurate spatial data[6] which we could easily download from ArcGIS Online servers. Table 1 in **Appendix A** also lists the types of concession agreements available on the LNCP.

Following these stages of data collection and ongoing quality assurance, we once again conducted open-source searches to supplement missing attributes, particularly those pertaining to financial information and corporate social responsibility provisions. Such efforts demonstrate the value of our database as not merely a synthesis of existing, public databases, but also an improvement upon them with unique third-party information.

Section 2: Attribute Definitions

This section details the 40+ attributes that comprise our database. The field names below are consistent with those found in the static geoJSON file of the database, located at http://aiddata.org, or the data downloaded from the "Tracking Natural Resources in Liberia" online dashboard. The static shapefiles (.shp) of the database contain concatenated fields that are further detailed in a "field_crosswalk" spreadsheet accompanying the level1 version of the dataset.

Table 2: List and Description of Attributes

Variable	Variable Name	Variable Explanation
aiddataID	AidData ID	A unique ID assigned by AidData for *each polygon* of the dataset.
licenseID	License Code	A three-letter prefix, followed by a number, that together represent a unique ID for a concession license. The code is sourced from official Liberian government records, when available.
ocid	Open Contracting ID	A globally unique identifier used to join up data on all stages of a contracting process, developed as part of the Open Contracting Data Standard (OCDS). The OCID is included when available.

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[3] The MCAS, implemented by the Revenue Development Foundation, has long existed within the MLME. However, in recent months, the MLME, in partnership with AusAid, GIZ, and German Development Cooperation, published an Online Repository (found at http://liberia.revenuesystems.org/login/auth) to make the MCAS accessible for external audiences.

[4] The challenge with the MCAS data involved reliably eliminating duplicates between it and the data collected from LEITI. Our research assistants underwent extensive row-by-row de-duplication of attribute information by matching licenses according to license number, start/end dates, resources, and company names. We also underwent a process of spatial de-duplication, in which spatial duplicates were identified and eliminated if they represented the same license. When there existed a spatial duplicate between the MCAS and LEITI, we defaulted to the MCAS as the source for the spatial data given its better accuracy and official sourcing.

[5] In order to do so, we obtained generous permission from Ciata Bishop, the head of the National Bureau of Concessions, which is hosting the LNCP in Liberia.

[6] Due to the quality and reliability of spatial data from the LNCP, we always defaulted to it if there were spatial duplicates for the same license across sources.

landmatrixID	Land Matrix ID	The ID of a particular land deal found on Land Matrix. The Land Matrix ID is included when available.
title	Title of Concession	A descriptive title assigned to a concession license (generally, the official title of a concession agreement, if available). It can also often be the name of a company if a title is not available.
sectors	Sector of Concession	Sector within which the concession operates. The four sectors include: (a) Agriculture (b) Forestry (c) Industry, Mining, and Construction (d) Oil and Natural Gas
company	Owner of License	The company holding the license/contract. If multiple holders are listed, companies are separated by a tab delimiter.
country	Nationality of Company	The country from which the company owning the license originates. If multiple countries are listed, they are separated by a tab delimiter.
sponsor	Third-party Funder	A third-party company or institution that funds activities within the concession area but is not the license holder. If multiple companies are listed, they are separated by a tab delimiter.
spNation	Nationality of Sponsor	The country from which the sponsor originates. If multiple countries are listed, they are separated by a tab delimiter.
pCompany	Parent Company	The parent company of the license holder. In instances where ownership is shared among multiple partners, we used the information of the majority investor (more specifically, greater than 50%) to code nationality. Data sources include self-reported data by concessionaires; proprietary databases such as Dun and Bradstreet, CompuStat, and ORBIS; and annual reports obtained from the websites of companies. If multiple companies are listed, they are separated by a tab delimiter in the same order as in the "company" field, so that each parent company matches with its subsidiary.
pCountry	Nationality of Parent Company	If applicable, the country in which the parent company is headquartered. If multiple companies are listed, they are separated by a tab delimiter in the same order as in the "country" field, so that each parent company matches with its subsidiary.
agency	Government Agency Issuing License	The government entity that issues licenses to prospective concessionaires within a specific sector. The agencies include: (1) Forest Development Authority (FDA) - issues forestry licenses (2) Ministry of Agriculture (MOA) - issues agriculture licenses (3) Ministry of Lands, Mines, and Energy (MLME) - issues mining licenses (4) National Oil Company of Liberia (NOCAL) - issues oil and natural gas licenses
contractor	Contractor Company	Company that has been contracted by the license holder to work on part or all aspects of a concession area.
dateStart	Start Date of Contract	Date in which the license comes into effect, formatted YYYY-MM-DD.
dateSign	Signature Date of Contract	Date in which the contract was signed, formatted YYYY-MM-DD.
yearSign	Year of Signature Date	The year in which the contract was signed, formatted YYYY.

dateEnd	Expiration Date of Contract	Date in which the contract expires, formatted YYYY-MM-DD..
payDate	Payment Date	Date in which fees or taxes for the license were paid, formatted YYYY-MM-DD. Unique to licenses sourced from the MCAS.
contractStatus	Status of Contract	Progression of the contract across its various stages. Contains the following values: (1) Pending - license has not yet come into effect, but is pending government approval (2) Active - license has come into effect and is ongoing (3) Terminated - license has expired, with all activities ceasing
duration	Term of Contract	The length of the contract, expressed in **years.**
contractSigned	Type of Contract	The type of contract between the license holder and government. Please see Tables 1 and 2 in Appendix A for a full list of contract types.
contractClass	Classification of Contract	Denotes an overarching classification for the contract, based on the type of FDI it represents. Values include: (1) Greenfield Investment - Entirely new agreement made between a firm and the government not based on any existing commercial or other infrastructure (2) Expansion of Existing Contract - Extension or modification of an older contract (3) Colocation - Joint Venture between a firm and the government
amountCurrent	Full Value of Contract (Current)	Full financial value of a concession.
amountConstant	Full Value of Contract (Constant)	Full financial value a concession, expressed in USD-2014.
currency	Currency of amount	Currency of the amountCurrent and amountConstant.
hectares	Area of Concession	Area of concession under contract, measured in hectares.
jobComm	Local Commitment to Job Creation	Denotes whether provisions exist within a concession contract to legally bind the license holder into reinvesting in local communities, specifically in the form of local jobs creation. Values include: (1) 1 - there exists a provision for local jobs creation (2) 0 - there does not exist a provision for local jobs creation (3) N/A - there is not enough information to determine whether a contract contains a provision for local jobs creation
revShare	Conditions Within Contract to Share Government Revenue	Contractual commitment for the firm and the government (or landowner in case of PUPs) to share profits from the project. Can be in the form of royalties or payment per quantity of resources produced (USD per barrel of oil, USD per cubic meter of logs, etc.)
csrComm	Corporate Social Responsibility Commitments	Contractual stipulations within a concession agreement for the license holder to engage in activities that benefit the local community within or surrounding a concession. Such activities include the provision of jobs to locals, the construction of infrastructure (such as roads, bridges, schools), and adherence to social agreements spelled out in the concession. Constructed as a 0/1 binary, with N/A indicating that there is not enough information to determine whether a contract has CSR commitments.

physInf	Commitments to Build Physical Infrastructure	Contractual stipulations within a concession agreement for the license holder to build infrastructure within or surrounding the concession area. Constructed as a 0/1 binary, with N/A indicating that there is not enough information to determine whether a contract involves commitments to build infrastructure.
resources	Commodities Derived from Concession License	Each concession involves the exploration or extraction of one or more commodities. Multiple commodities for a particular contract are separated by a tab delimiter.
tender	Existence of Competitive Tender	Denotes whether concessionaire maintained an open-bidding process for procuring contractors. Constructed as a Yes/No binary, with N/A indicating that there is not enough information to determine whether a contract involves a competitive tender.
security	Security Guarantees from the Government	Denotes whether the government, as part of the contract, guaranteed security for the license holder around a designated concession area. Constructed as a Yes/No binary, with N/A indicating that there is not enough information to determine the presence or absence of security guarantees.
vsc	Violent and Social Conflict	Denotes whether a particular concession area is subject to social protest or forms of violent conflict from local communities within or surrounding the concession.
vscSource	Source for vsc	A URL or other source for the "vsc" variable.
addSource	Additional Information (not found elsewhere)	Whether there exists any additional information pertaining to the license, including source information for attributes collected using open-source searches.
source	Main Source	Main source of attribute and spatial information for a particular license. Values include: (1) LEITI (2) Mining Cadastre Administration System (3) Liberia National Concessions Portal Multiple values are separated using a tab delimiter (if attributes for a license were sourced from more than one source)
sourceURL	URL to Main Source	Multiple values are separated using a tab delimiter (if attributes for a license were sourced from more than one source)
lastUpdate	Date of Last Update from AidData/CWG	Date of last update of attribute information from AidData/CWG RAs. Applicable to data from the Mining Cadastre Administration System and the Liberia National Concessions Portal, given that information in those databases may be updated overtime.

Section 3: Geo-referencing Concession Agreements

In order to georeference contracts sourced from LEITI, AidData developed a methodology to convert coordinate information into spatial information denoting the boundaries of a concession area. This section describes the step-by-step process taken to georeference such concession areas and generate reproducible error rates. This process is unique LEITI contracts, due to the lack of explicitly spatial information that can be readily integrated into our database, such as the data provided by the MCAS and LNCP.

1. **Step 1 - Finding the Concession Area**: Four types of location details can be found in LEITI documents pertaining to the boundaries of a concession area:

(1) Decimal degrees describing the vertices of a polygon, which represent a concession area
(2) UTM coordinates describing the vertices of a polygon
(3) Survey coordinates that provide location information for each vertex of the polygon
(4) Survey coordinates that do not provide location information for each vertex of the polygon.

The first type is the most ideal, as one can merely enter the latitude/longitude of the polygon's vertices in order to define the area of the concession; the second and third types involve converting the coordinates into decimal degrees.

The fourth type of location details presents the greatest challenge to geo-reference. **In Step 2**, we outline the process for converting such location information into sequential points.

2. **Step 2 - Converting Survey Coordinates into Sequential Points**: In order to translate the description of a concession area into precise coordinates that can be geo-referenced, our team used online tools that allow conversion of azimuth/bearings into decimal coordinates. Such a tool can be found here: https://www.fcc.gov/media/radio/find-terminal-coordinates. Once each azimuth is converted into the vertex of a polygon, our team geocoded the vertices, effectively drawing the perimeter of a concession. Since this process was done twice in accordance with AidData's double-blind geocoding methodology, it resulted in two sets of concessions. In **Step 3**, we describe the process for arbitrating these points and ensuring the closest spatial approximation to the true area of the concession.

3. **Step 3 - Generating Error Rates**: Once the vertices had been geo-referenced, an AidData staff member served as an arbitrator to create vector polygons from coordinate pairs. The area of the generated polygons (in square meters) were then compared to the area described in or digitized from the concession document[7], with an error rate calculated for each polygon. Error rates were also created for other polygons generated through the other three types of location details, as outlined in **Step 1**.

Appendix A: Types of Licenses Across Sources

Table 1: Types of Licenses in LEITI and LNCP

Name	Description	Source of Description
Agricultural Concession	An agreement in which the Liberian government leases land away to a foreign entity in the agriculture sector in exchange for the payment of fees and royalties. The foreign entity has the right to explore and extract natural resources from that land, in this case Rubber and Palm Oil.	"Foreign Direct Investment (FDI) in Land in Developing Countries" by GIZ[8]

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[7] See **Appendix B** for a detailed process for digitizing maps using QGIS, an open-source GIS software
[8] GIZ 2008

Private Use Permit	A type of framework agreement, established in 2006, allowing private individuals to sign contracts with companies for extractive activities. They are approved by the government.	Global Witness and Sustainable Development Institute
Timber Sale Contract	"A TSC is considered a short-term Forest Resource License issued by the Government under Section 5.4 of the NFRL, which is established on the basis of bidding for areas up to 5,000 ha. Bidders must demonstrate at least 51% ownership by Liberian citizens. Contractors must prepare an annual operations plan. Consistent with land planning requirements specified in the law, TSCs can be awarded for the purpose of allowing forest land to be cleared for agriculture or the establishment of plantations, and is in place for three years."	"FOREST CONCESSIONS—COMMERCIAL FOREST REVENUE PROJECTION MODEL" by USAID[9]
Development Exploration License (DEL)	"An Exploration License is granted over an unencumbered contiguous parcel of land not exceeding 1000 km2 for an initial period of 3 years and may be extended for another 2 year period if the holder complies with the terms and conditions of the Mining Law and the Mineral Exploration Regulations. An Exploration Agreement must be concluded between the holder and the Government and a proposed work program must be submitted to the Minister within 90 days of the grant of the license. At or before the expiration of the license, the holder may choose to retain the entire exploration area or any part thereof as a Proposed Production Area or apply for an extension of the exploration license after surrendering a minimum of 50% of the original exploration area at the end of the initial term of the exploration license. The right to explore does not include the right to engage in bulk sampling or pilot mining and the holder is restricted to explore for minerals only in his defined area. Other terms and conditions set forth in the Mining Law and the Mineral Exploration Regulations have to be adhered to."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI[10]
Mineral Exploration License (MEL)	"An Exploration License is granted over an unencumbered contiguous parcel of land not exceeding 1000 km2 for an initial period of 3 years and may be extended for another 2 year period if the holder complies with the terms and conditions of the Mining Law and the Mineral Exploration Regulations. An Exploration Agreement must be concluded between the holder and the Government and a proposed work program must be submitted to the Minister within 90 days of the grant of the license. At or before the expiration of the license, the holder may choose to retain the entire exploration area or any part thereof as a Proposed Production Area or apply for an extension of the exploration license after surrendering a minimum of 50% of the original exploration area at the end of the initial term of the exploration license. The right to explore does not include the right to engage in bulk sampling or pilot mining and the holder is restricted to explore for minerals only in his defined area. Other terms and conditions set forth in the Mining Law and the Mineral Exploration Regulations have to be adhered to."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI

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[9] USAID 2015
[10] EITI 2015

Forest Management Contract (FMC)	"Under the NFRL (2006) as presented by Blazer (2008), the FMC is a Forest Resource License issued by the Government under Section 5.3 of the NFRL, which includes concession areas of at least 50,000 ha and no more than 400,000 ha in size. The large area of the concession is designed to promote a model of large-scale, export-oriented logging. Areas between 50,000 and 99,999 ha are open for bids form qualified bidders that demonstrate at least 51% ownership by Liberian citizens. All FMCs over 100,000 ha are also open for bidding to international investors. Among other conditions, an FMC requires the preparation of a sound, long-term forest management plan, including inventories and annual operational plans and less detailed plans for each 5-year period of harvesting activities that eventually cover the entire contract area. The annual operations plan includes major activities such as road construction, as well as detailed projections of harvest volumes based on individual stand maps."	"FOREST CONCESSIONS—COMMERCIAL FOREST REVENUE PROJECTION MODEL" by USAID
Mineral Development Agreement (MDA)	"A Mineral Development Agreement is negotiated between the holder of an Exploration License (who has received and furnished to the Government a written opinion of a Competent Person that a portion of the Exploration Area contains Inferred Mineral Resources that are within the scope of the Exploration License) and the Government. This request is made by the holder of an Exploration License to the Government to extend and modify its rights under its Exploration License and to enter into this Agreement for the purpose of confirming the terms and conditions that will govern the Company's transition to a Class A mining license and its operations under a Class A mining license. The terms and conditions for an MDA are negotiated between the operator and the Government representatives on the Inter-Ministerial Mineral Concession Committee using the standards set forth in the "Model Mineral Development Agreement"."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI
Production Sharing Contract (PSC)	"A PSC is a widely-used agreement between a state and an oil company, which enables the company to explore and develop oil and gas reservoirs within a specified area in return for performance of specific obligations, including payment of royalties and tax."	"Guide to Extractive Industries Documents – Oil & Gas" by World Bank[11]

Table 2: Types of Mining Licenses in MCAS

Name	Description	Source of Description
Class A Mining License	"A Class A Mining license is granted to an existing operator within the mining sector who after a considerable length of time undertaking mineral exploration to the satisfaction of the Ministry of Lands, Mines & Energy has made a discovery of exploitable mineral deposits and have identified a Proposed Production Area.	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI

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[11] World Bank 2015

|	The Operator is required to be in compliance with the terms and conditions of his/her MDA, successfully completed a Proposed Exploration Program, completed a Feasibility Report describing a plan for the efficient and economic conduct of mining in the Proposed Production Area. The Feasibility Report must be approved by the Minister. The initial term of the Class A Mining license shall not exceed 25 years, and may be extended, in each case a showing that proven Scoping Study in the Mining Sector conducted by MAC Africa Consultants for LEITI reserves exist, and upon submission of a revised and updated Feasibility Report, for conservative additional terms not to exceed 25 years each."	
Class B Mining License	"A Class B Mining license is granted over an area not subject to a mineral right granted to another person (unencumbered area) on the same terms and conditions as a Class C Mining license with exceptions set forth in Section 6.4 of the MML of 2000. The initial term of the Class B Mining License is for 5 years and any renewals thereof shall not be for more than 5 years each. The holder of a Class B Mining license may conduct operation as an industrial operation (semi-mechanized). Up to 15 holders of a Class B Mining license may form a cooperative upon the approval of the Minister of Mines. A production plan has to be filed and approved by the Ministry of Mines prior to commencing operation with subsequent annual submission and approval by the Ministry. A Class B Mining License can be granted to other nationals in partnership with Liberian citizens."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI
Mineral Exploration License (MEL)	"An Exploration License is granted over an unencumbered contiguous parcel of land not exceeding 1000 km2 for an initial period of 3 years and may be extended for another 2 year period if the holder complies with the terms and conditions of the Mining Law and the Mineral Exploration Regulations. An Exploration Agreement must be concluded between the holder and the Government and a proposed work program must be submitted to the Minister within 90 days of the grant of the license. At or before the expiration of the license, the holder may choose to retain the entire exploration area or any part thereof as a Proposed Production Area or apply for an extension of the exploration license after surrendering a minimum of 50% of the original exploration area at the end of the initial term of the exploration license. The right to explore does not include the right to engage in bulk sampling or pilot mining and the holder is restricted to explore for minerals only in his defined area. Other terms and conditions set forth in the Mining Law and the Mineral Exploration Regulations have to be adhered to."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI
Reconnaissance License	"A Reconnaissance License is issued over an unencumbered parcel of land not exceeding 2000 km2 for a maximum period of 6 months which is renewable only once for another 6 months provided that the operator has met all the requirements set forth in the Mining Law and other pertinent mineral regulations. The operator of this license is expected to conduct non-invasive geologic exploration (grab sampling, no drilling or sinking of pits). A holder is expected to submit an evaluation report of the mineral potential of the area within 3 months after the expiration of the license."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI
Prospecting License	"A Prospecting License is issued over an area not to exceed 100 acres and is granted for an initial period of 6 months with the possibility of one time renewal for another period of 6 months provided the operator has met all requirements under the Mining Law and other relevant regulations."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI
Quarry License	"A Quarry License gives the right to the holder to develop, mine	"SCOPING STUDY ON

	and sell building and an industrial mineral found within the area subject to the license (not exceeding 50 acres) and is valid for an initial period of 5 years and may be renewed for the same period on subsequent applications upon approval by the MINISTER."	THE MINING SECTOR" by MAC Africa Consultants for LEITI
Mineral Development Agreement (MDA)	"A Mineral Development Agreement is negotiated between the holder of an Exploration License (who has received and furnished to the Government a written opinion of a Competent Person that a portion of the Exploration Area contains Inferred Mineral Resources that are within the scope of the Exploration License) and the Government. This request is made by the holder of an Exploration License to the Government to extend and modify its rights under its Exploration License and to enter into this Agreement for the purpose of confirming the terms and conditions that will govern the Company's transition to a Class A mining license and its operations under a Class A mining license. The terms and conditions for an MDA are negotiated between the operator and the Government representatives on the Inter-Ministerial Mineral Concession Committee using the standards set forth in the "Model Mineral Development Agreement"."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI
Development Exploration License (DEL)	"An Exploration License is granted over an unencumbered contiguous parcel of land not exceeding 1000 km2 for an initial period of 3 years and may be extended for another 2 year period if the holder complies with the terms and conditions of the Mining Law and the Mineral Exploration Regulations. An Exploration Agreement must be concluded between the holder and the Government and a proposed work program must be submitted to the Minister within 90 days of the grant of the license. At or before the expiration of the license, the holder may choose to retain the entire exploration area or any part thereof as a Proposed Production Area or apply for an extension of the exploration license after surrendering a minimum of 50% of the original exploration area at the end of the initial term of the exploration license. The right to explore does not include the right to engage in bulk sampling or pilot mining and the holder is restricted to explore for minerals only in his defined area. Other terms and conditions set forth in the Mining Law and the Mineral Exploration Regulations have to be adhered to."	"SCOPING STUDY ON THE MINING SECTOR" by MAC Africa Consultants for LEITI

Appendix B - Digitizing Information from Existing Maps

This section provides step-by-step instructions for digitizing concession areas from a PDF or other static map. Click here for a quick video tutorial for concession digitization.

Create Geotiff of PDF map.

Import Geotiff file as a raster layer.
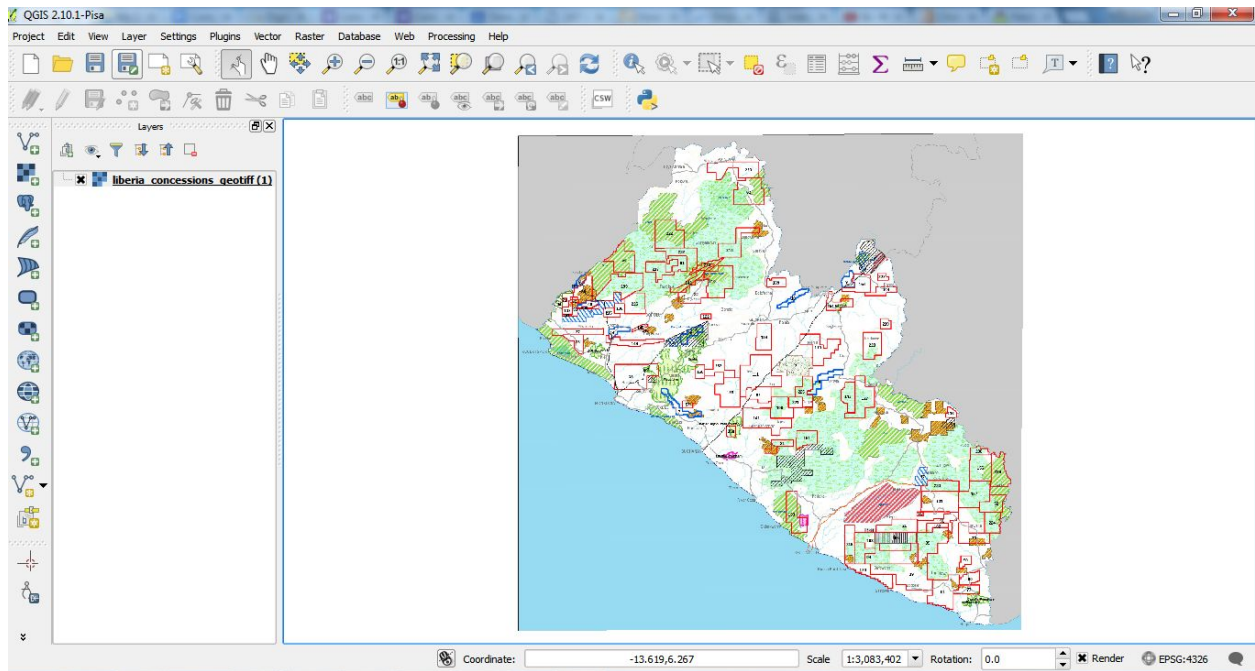
Under the "Settings" heading at the top of the page select "Options".

From the options window navigate to the digization tab. The options window allows users to customize the look and feel of the digitization tool.

Next, under the "Layers" heading select "create new layer" followed by "new spatialite layer".

The window (below) will allow you to select the type of digitization, name the file you will be producing, and select attributes for the layer. The selection of attributes will depend in large part on the information provided. That being coders should (1) capture as many attributes about each location as possible and (2) assign a unique numeric identifier to each entry (3) ensure that the CRS you select matches that of the geotiff.

After creating the new layer, right-click on the layer name on the far left of the screen and select toggle editing.

Zoom to a feature you wish to digitize and trace the shape, clicking on each vertex. Right-click once you have traced the full feature to stop digitizing. QGIS will display a table in which to record feature attributes. Populate the table with all available information and click OK. After entering this data and clicking submit the new feature will render on the map.