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UNITE OPERATIONNELLE DE SUIVI DU COUVERT FORESTIER
THE OPERATIONAL UNIT FOR MONITORING FOREST COVER

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REPORT ON LANDMARK DEFORESTATION EVENTS IN 2019

WORLD RESOURCES INSTITUTE

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EDITORIAL BOARD

FOREWORD

Jules Doret NDONGO
Minister of Forestry and Wildlife

This 2019 Annual Report on Landmark Deforestation Events (LDEs) based on Global Land Analysis and Discovery (GLAD) alert tools, the first of its kind, is produced by the Operational Unit for Forest Cover Monitoring (UOSCF), set up by Order No 0086/MINFOF/C2D-PSFE2 of 18 May 2016.

Exactly reproducing forest cover loss in Cameroon, this report directly addresses the requirements of modern sustainable management. It follows up on Cameroon's global and regional commitments, notably with respect to sustainable management of production forests, Reducing Emissions from Deforestation and Forest Degradation (REDD+) and the African Forests Landscape Restoration (AFR100) Initiative.

It is a specialised document predicated on the GLAD approach developed by the University of Maryland on forest cover dynamics, and is born of the partnership between MINFOF and World Resources Institute (WRI). I wish to commend WRI, a major technical partner since the year 2000, for their scientific contribution to our sector of activity. Its development services, production and publication of the Forestry Atlas of Cameroon online are recognised and dedicated actions.

UOSCF, whose assigned mission is to conduct time-series monitoring per geo-ecological area, prioritises the use of these alerts for annual reporting of forest cover changes, in a bid to promote a novel vision for sustainable forest management. It is our hope that the prime targets of this publication, that is, institutional and private partners, researchers and research institutes, would factor in the information contained herein.

The Ministry is faced with the challenge of sustaining the production and dissemination of this invaluable report, a real institutional action guidance tool for the strategy to fight against illegal logging, and promote reforestation, land use and sustainable forest management. We will also have to define the missions of the Operational Unit in future institutional development plans.

ABSTRACT

This annual report on landmark deforestation events (LDEs) has been drafted as part of Cameroon's Forest Cover Monitoring activities by the Ministry of Forestry and Wildlife (MINFOF) and the Ministry of Environment, Protection of Nature and Sustainable Development (MINEPDED), through the Operational Unit for Forest Cover Monitoring (UOSCF) in collaboration with its technical and financial partner, World Resources Institute (WRI).

It aims, overall, to present trends in forest cover changes in Cameroon in 2019, using Global Land Analysis and Discovery (GLAD) alerts technology. More specifically, this report describes serial evolution of alerts by Region according to land use types and drivers of forest cover change. The report will facilitate proper planning of missions to implement the National Forestry and Wildlife Control Strategy as a decision-making tool, and will help provide guidelines for improved forest management policies.

Alerts visible on the Global Forest Watch (GFW) platform were downloaded and the alert aggregates digitised. Those that met LDE concept requirements were selected. The LDEs were validated by Computer-Assisted Photo-Interpretation (CAPI) of Sentinel 2 and Digital Globe time series satellite images. Surface areas were calculated automatically in ArcGIS Desktop 10.8.1 interface. After exporting the attribute tables into the Excel spreadsheet, the team aggregated the data at national level and also by Region according to the structure of the forest estates and canopy change drivers, on a quarterly basis.

Nationwide, 127,804 GLAD alerts (loss and/or gain) were reported on the aforementioned platform. Among the forest cover loss alerts, 2,360 aggregates were digitised into polygons and 1,178 selected as LDEs for a surface area of approximately 3,628.61 ha, of which 10.5% (381.03 ha) were found in the Permanent Forest Estate (PFE) and 89.5% (3,247.58 ha) in the Non-Permanent Forest Estate (NPFE). The East Region had the most LDEs with a proportion of approximately 54.77% of the depletion in national forest cover. In that Region, canopy loss mainly concentrated on plots of less than 5 ha. The upsurge of plantations in the Littoral Region is reducing forested areas. Here, over 20 ha of deforested areas were identified, thus 27.33% of the national deforestation rate.

Varying forms of agriculture (59.99%) are the prime drivers of deforestation. Logging (34.45%), mining (5.11%) and infrastructure development projects (0.45%) are the other drivers of deforestation. A significant loss in Cameroon's forest cover was observed in the first (Q1) and fourth (Q4) quarters.

This report concludes, based on LDEs in 2019, that the deforestation rate is 0.0168% in relation to the surface area of Cameroon forests. The deforestation rate in the Permanent Forest Estate stands at 0.0027%.

Key words: GLAD Alerts, Landmark Deforestation Event, Forest Estate, deforestation drivers.

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LIST OF ABBREVIATIONS AND ACRONYMS

VPA-FLEGT	Voluntary Partnership Agreement/Forest Law Enforcement, Governance and Trade
NPFE	Non Permanent Forest Estate
PFE	Permanent Forest Estate
LDE	Landmark Deforestation Event
FAO	Food and Agriculture Organisation of the United Nations
CF	Council Forests
ComF	Community Forests
FRA	Forest Resources Assessment
GFW	Global Forest Watch
GLAD	Global Land Analysis and Discovery
MINEPDED	Ministry of Environment, Protection of Nature and Sustainable Development
MINFOF	Ministry of Forestry and Wildlife
NTFP	Non-Timber Forest Product
CAPI	Computer-Assisted Photo Interpretation
REDD+	Reducing Emissions from Deforestation and Forest Degradation, Conservation of Carbon Stocks, Sustainable Forest Management and Building of Forest Carbon Stocks
FMU	Forest Management Unit
UOSCF	Operational Unit for Forest Cover Monitoring
USFS	United States Forest Service
SSV	Sales of Standing Volumes
WRI	World Resources Institute

DEFINITION OF CONCEPTS

Forest

Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than10%, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use (FAO, 2009). According to Forestry Law No. 94/01 of 20 January 1994 to lay down Forestry, Wildlife and Fisheries Regulations in Cameroon, "Forest means any land covered by vegetation with a predominance of trees, shrubs and other species capable of providing products other than agricultural produce."

Deforestation

Although the Intergovernmental Panel on Climate Change (IPCC) recommends that countries report forest cover loss and greenhouse gas emissions using an internationally agreed definition, such as the Food and Agriculture Organisation of the United Nations (FAO) definition, there are no globally agreed definitions of «deforestation» and «degradation» within the UNFCCC itself. Definitions vary from country to country and within countries at national, provincial and local levels.

Deforestation refers to land cover change with a forest cover loss of less than 10 %, that is, conversion of forest to other land uses or permanent reduction of forest cover below the minimum threshold of 10 % (FAO, 2015).

Degradation

Changes within the forest class (e.g. from closed to open forest) that negatively affect the stand or site and, in particular, lower the productive capacity, are referred to as forest degradation (FAO, 1998).

It takes different forms, particularly in open forest formations, deriving mainly from human activities such as overgrazing, overexploitation (firewood or logging), repeated fires, or due to attacks by insects, diseases, plant parasites or other natural sources such as cyclones. In most cases, degradation does not show as a decrease in the surface area of woody vegetation but rather as a gradual reduction of biomass, changes in species composition and soil degradation. Unsustainable logging practices can contribute to degradation if the extraction of mature trees is not accompanied with their regeneration or if the use of heavy machinery causes soil compaction or loss of productive forest area (FAO, 1998).

It is the long-term reduction of the overall potential supply of benefits from the forest, which includes carbon, wood, biodiversity and other goods and services (FAO, 2009).

GLAD alert

Any Landsat image pixel of 30-metre spatial resolution that can detect changes at a much finer spatial scale for losses in excess of 50% of cover. It is a dataset created by the Global Land Analysis and Discovery (GLAD) laboratory of the University of Maryland and made available for visualisation on the Global Forest Watch platform for more efficient monitoring of forest cover dynamics.

Tree cover

Any vegetation over 5 metres high with more than 60% forest cover, and may be natural forests or plantations (Source: GLAD/UMD, accessible on the Global Forest Watch platform).

Forest cover loss

Loss of canopy by at least half a pixel and may be due to a variety of factors, including mechanical harvesting, fire, disease or storms. As such, «loss» is not equivalent to deforestation (Source: GLAD/UMD, accessible on the Global Forest Watch platform).

Landmark deforestation event (LDE)

Aggregation of GLAD alerts corresponding to at least 1 ha of forest cover loss.

INTRODUCTION

Cameroon's forests are important locally, regionally and globally by virtue of the diverse environmental services they provide. This notwithstanding, these forests are exposed to several threats that impact their capacity to produce goods and services. Good knowledge of forest resources is essential for their sustainable management, and access to accurate, credible and timely information, which supports decision-making, is a key factor of good governance in the forestry sector (WRI, 2012).

Cameroon has taken on a number of national and international commitments to ensure the sustainable management of natural resources and ecosystems through the Ministry of Forestry and Wildlife (MINFOF) and the Ministry of Environment, Protection of Nature and Sustainable Development (MINEPDED). These include its commitment to the Voluntary Partnership Agreement / Forest Law Enforcement, Governance and Trade (VPA/FLEGT) programme, the African Forests Landscape Restoration Initiative (AFR100) and the Reducing Emissions from Deforestation and Forest Degradation, Conservation of Carbon Stocks, Sustainable Forest Management and Enhancement of Forest Carbon Stocks (REDD+) facility. For greater credibility to ensure transparency in complying with these commitments, the Operational Unit for Forest Cover Monitoring (UOSCF) was set up by Order N° 0086/MINFOF/C2D-PSFE2 of 18 May 2016 and placed under the dual supervisory authority of MINFOF and MINEPDED. This unit has, since August 2018, and with technical collaboration from World Resources Institute (WRI), been using GLAD alerts developed by the University of Maryland to monitor Cameroon's forest cover. It was planned that a report on LDEs in Cameroon will be produced for the year 2019.

This report aims, overall, to present forest cover change trends in Cameroon using GLAD alerts technology. Specifically, it seeks to present forest loss dynamics in each Region of Cameroon, highlight changes in forest cover loss according to Cameroon's forest structure and identify the drivers of such forest cover loss.

1. METHODOLOGY

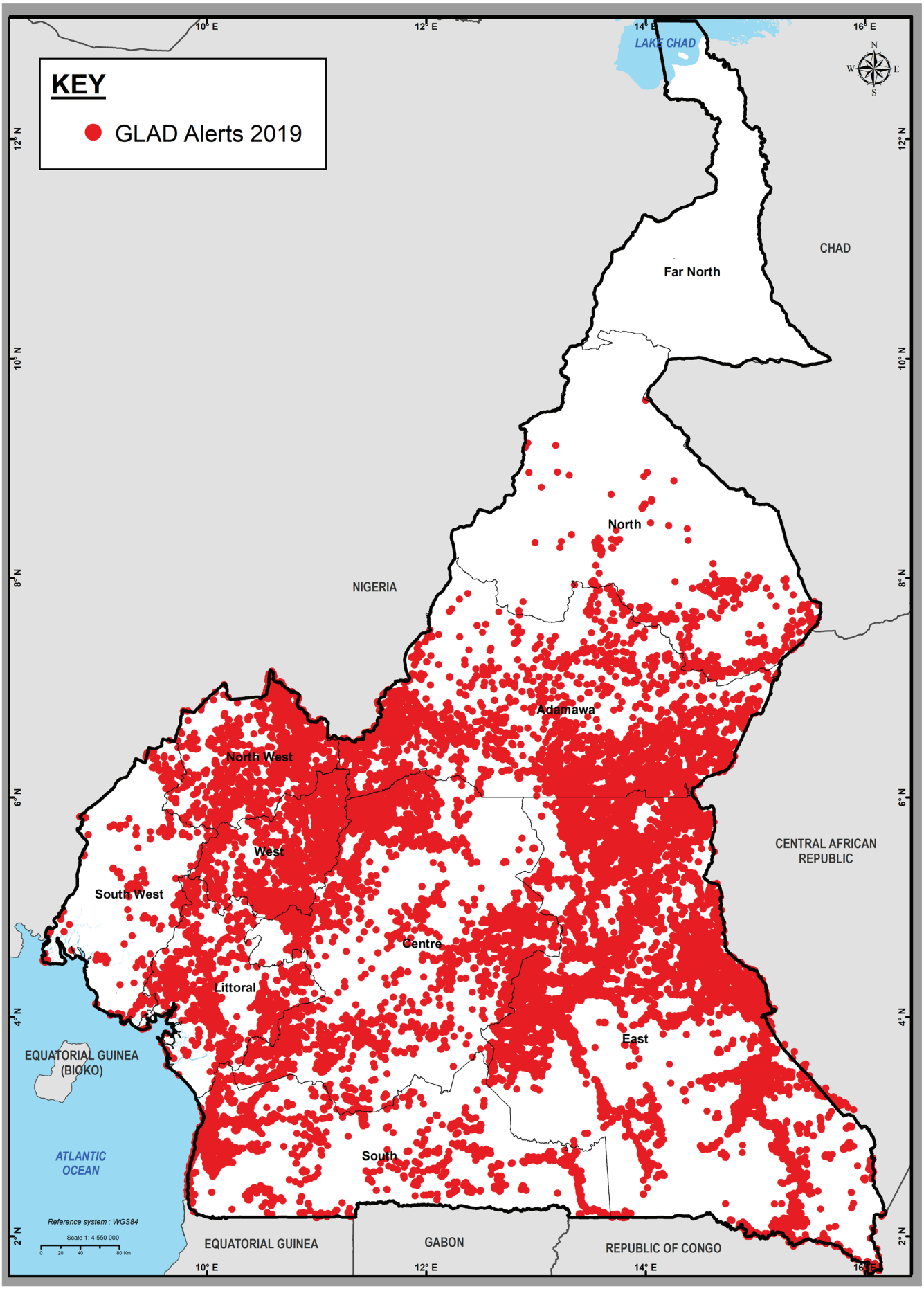
A task force of UOSCF staff supported by WRI experts was set up to draft Cameroon's Annual Report on LDEs. The drafted report was forwarded to resource persons in various sector ministries for approval.
The report was prepared in 3 (three) phases, including data collection, data processing and presentation of findings.

1.1. Data collection

Extraction of GLAD alerts
GLAD alerts (Figure 1) were downloaded from http://glad-forest-alert.appspot.com website. They indicate a weekly change in forest cover at a spatial resolution of 30*30 metres (900 m²). These alerts are confirmed at least at the third pass of the satellite (i.e. on the 24th day, given that the satellite passes every 7th to 8th day). Confirmed alerts are downloaded in CSV format (Excel), converted to vector format (shapefiles) and then sorted by month.


Photo credit: WRI

Figure 1 : Distribution of GLAD alerts nationwide in 2019.



Acquisition of satellite images

Sentinel 2 (10-metre resolution) and Quickbird (0.5-metre resolution) satellite images respectively downloaded from the websites https://remotepixel.ca and https://evwhs.digitalglobe.com, were used for photo-interpretation. These images were chosen for LDE identification because they are good resolution images and are supplied frequently. This report considered Sentinel 2 satellite imagery from December 2018 to January 2020 so as to compare the changes that occurred in 2019. QuickBird images were downloaded to address visibility issues due to clouds observed on some Sentinel 2 images (coastal areas).

Acquisition of forest mapping data

Forest mapping data specifying all forest concessions (FMU, Council Forest, Forest Reserve, Protected Area, Community Forest, Sale of Standing Volumes) granted by MINFOF, and Agro-industrial Plantations are lodged on a server that can be accessed via the link: www.cmr.forest-atlas.org. This data was extracted as vector files (shapefiles).

1.2. Data processing

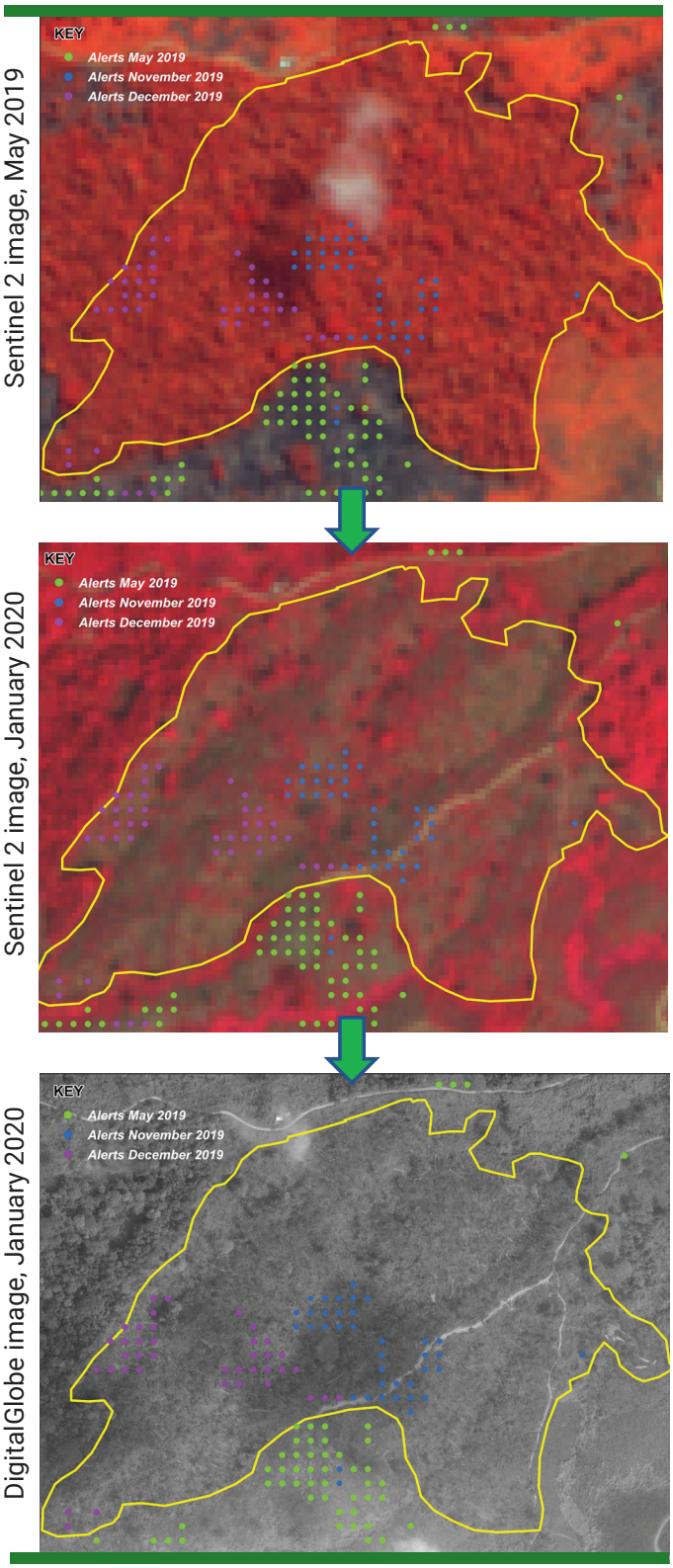
Digitalising deforested areas

Confirmed points (alerts) or groups of alert points (aggregates) were digitised and validated by Computer Assisted Photo-Interpretation (CAPI). To obtain the best colour composition, Sentinel image bands 2, 3, 4 and 8 were used. At this stage, alert files for each month were superimposed on the satellite images before and after detection in order to identify and digitise the area that had witnessed a change. Thereafter, it was superimposed on forest mapping data to sort events according to forest concessions.

For a better digitisation, two criteria were taken into account:

- Changes spanning an area of at least 1 (one) hectare occurring in the same month.
- Those covering an area of at least 1 (one) hectare, occurring over several months and having the same driver, were digitised continuously for the duration of the change (Figure 2).

Figure 2 : Summary of LDE digitisation stages.



1.3. Verification of LDEs

Other sources of information were used to confirm LDEs and document deforestation drivers:

- High-resolution satellite images (Digital Globe)
- Field mission to a randomly chosen site (Figure 3).

Figure 3 : LDE in Batouri (Photo courtesy MINFOF/WRI mission, november 2019).

2. FINDINGS

2.1. Presentation of landmark deforestation events in Cameroon

Findings on the identification of LDEs in Cameroon are presented for each Region and at national level.

2.1.1. LDEs at national level

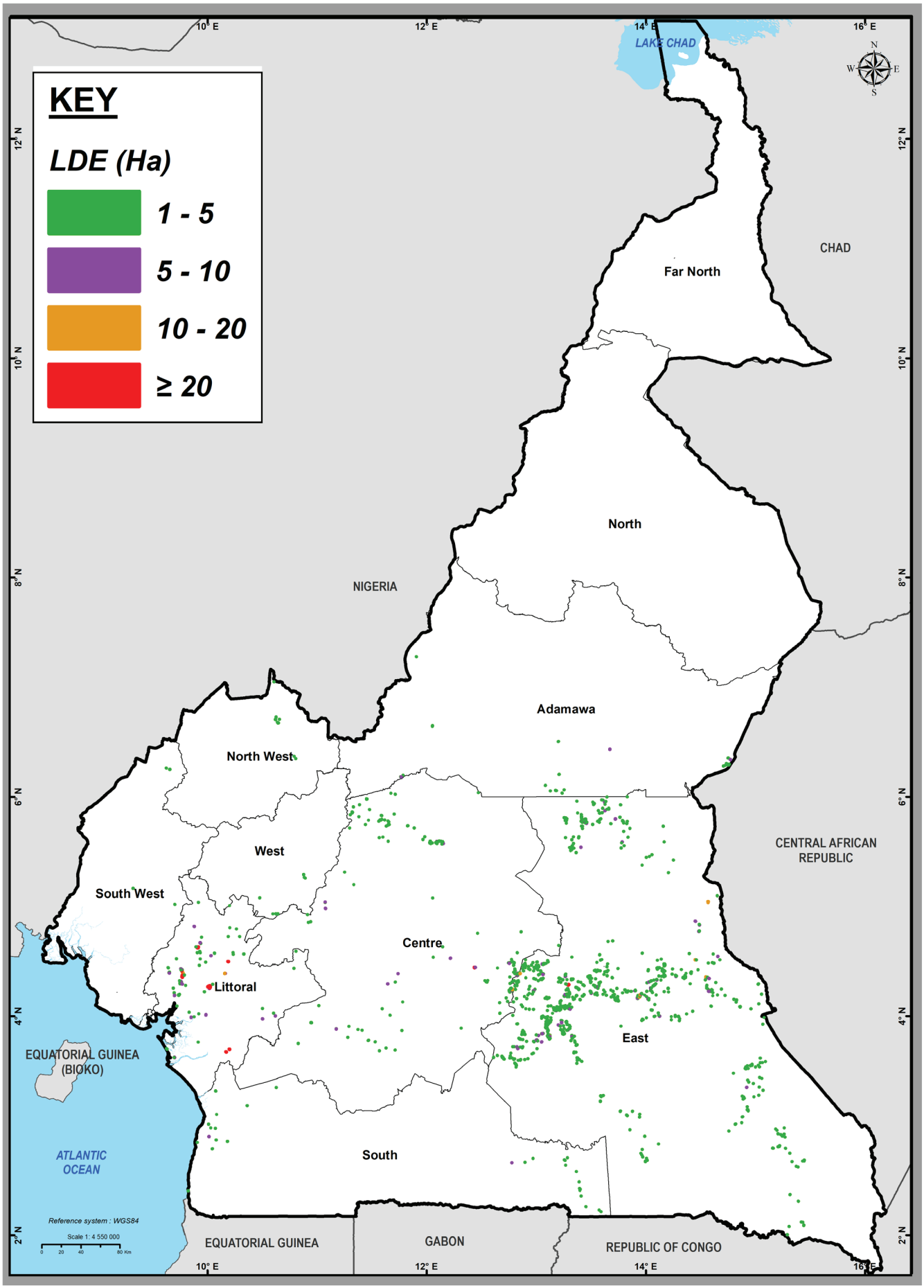
From January to December 2019, 127,804 (one hundred and twenty-seven thousand eight hundred and four) GLAD alerts (loss and/or gain) were reported on the GFW platform. Out of the forest cover loss alerts, 2,360 aggregates were digitised into polygons and 1,178 were selected as LDEs (Table 1 and Figure 4).

Table 1 : Number and area of LDEs per class

LDE class (ha)	Number of LDEs	Surface area (ha)
[1 - 5[	1 067	2 152.95
[5 - 10[	86	565.94
[10 - 20[	12	159.83
[20 ; + [	13	749.88
Total	**1 178**	**3 628.61**

It can be seen from this table that 3,628.61 ha of forests were transformed or converted to other land use types. Alert aggregates that constituted LDEs were in the majority for areas of less than 5 ha, thus a proportion of 59.33% of forests lost in Cameroon in 2019. Most LDEs with large surface areas (over 20 ha) were from expansion of Agro-industrial plantations. On the whole, forest regions of Cameroon had more LDEs than those deemed to be non-forest regions.

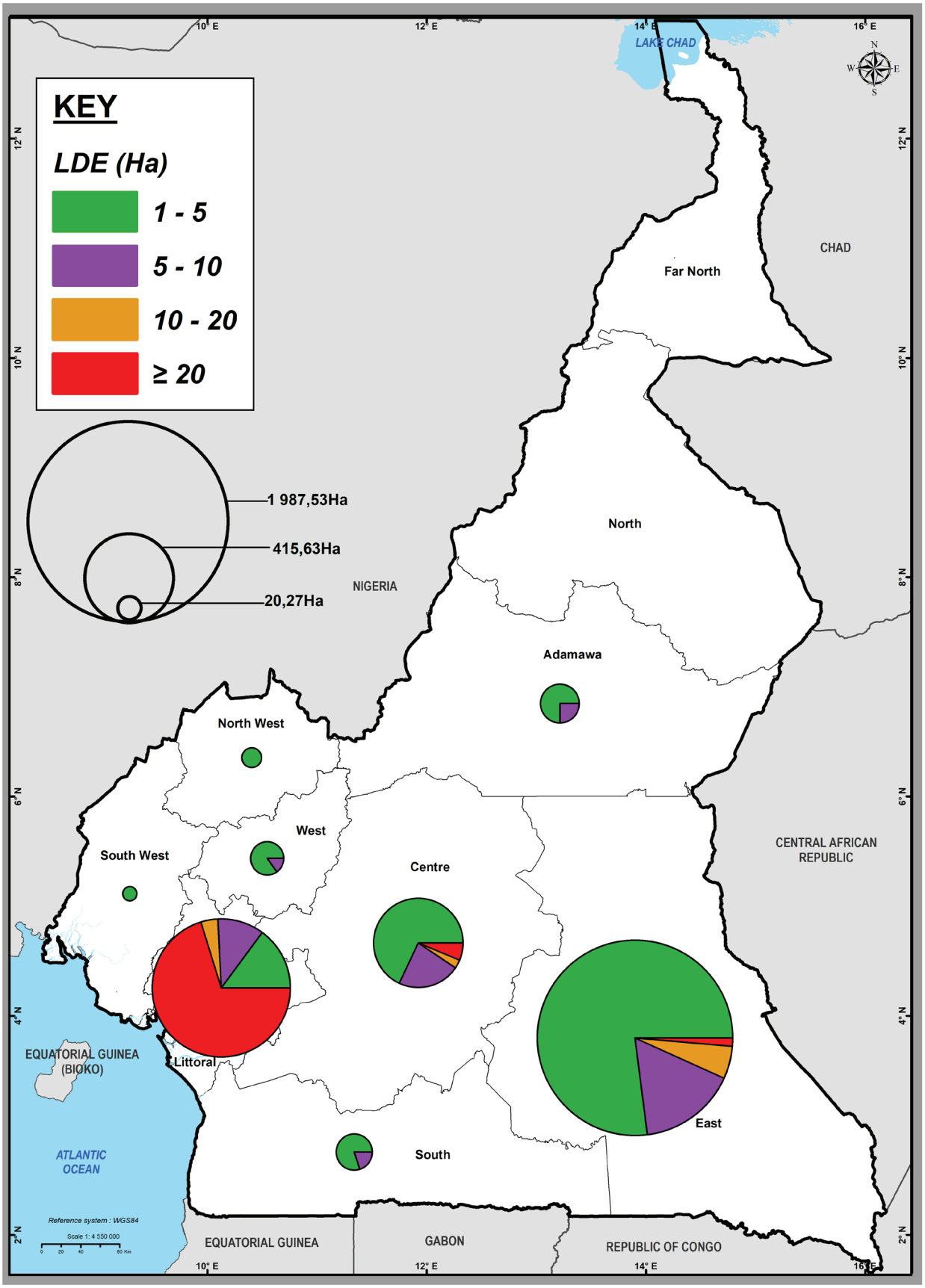
Figure 4 : Distribution of LDEs nationwide



2.1.2. LDEs by Region

Areas identified as LDEs are unevenly distributed nationwide and vary from Region to Region (Figure 5).

Figure 5 : Distribution of LDEs by Region.



This uneven distribution of LDEs by Region is illustrated in terms of clearings or gaps created by human or natural activities as shown in Table 2.

Table 2 : Area of LDEs per Region.

Regions	Area of LDEs by class (ha)				Total
	[1 -5[	[5 - 10[	[10 - 20[	[20; + [	
East	1 531	322.11	107.26	27.16	1 987.53
Littoral	147.56	108.25	39.49	696.54	991.84
Centre	282.48	93.89	13.09	26.17	415.63
Adamawa	58.38	19.39	0	0	77.77
South	54.30	13.62	0	0	67.92
West	48.55	8.69	0	0	57.24
North-West	20.27	0	0	0	20.27
South-West	10.41	0	0	0	10.41
TOTAL					**3 628.61**

Looking at the table above, LDEs were most widely observed in the East Region with 77.33% occupied by plots of less than 5 ha. Conversely, the South West and North West Regions do not have significant deforested areas considered as LDEs and only plots of less than 5 ha correspond to the said LDEs. This is due to new farms for subsistence agriculture. The North and Far North Regions do not show LDEs because the alerts detected do not meet LDE requirements.
Areas where deforestation and degradation were most significantly observed were identified in the Littoral Region. For an identified area of 991.84 ha, 70.23% is occupied by clearings spanning over 20 ha. In the same Region, clearings were observed on areas of 196 ha, 115 ha and 59 ha. Following verification with high-resolution images, it was evident that these gaps corresponded to continuous expansions of Agro-industrial plantations. Figure 6 below shows LDEs identified on a plantation expansion area in the Littoral Region.

Figure 6 : LDEs in agro-industrial plantation expansion areas in the Littoral Region.

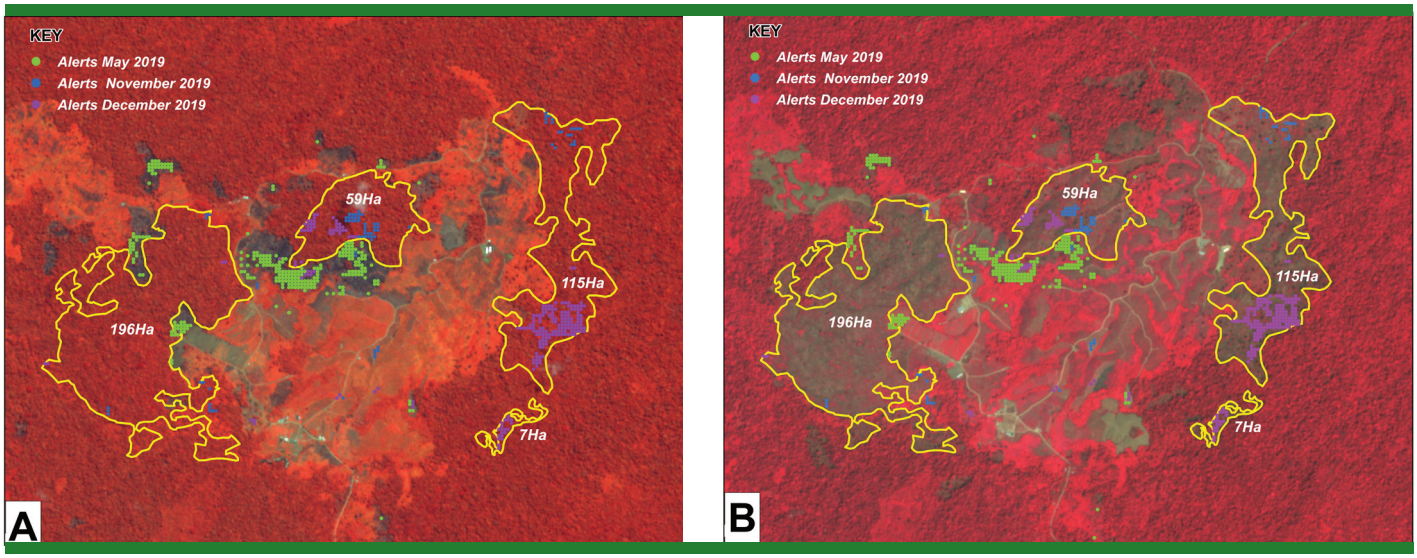


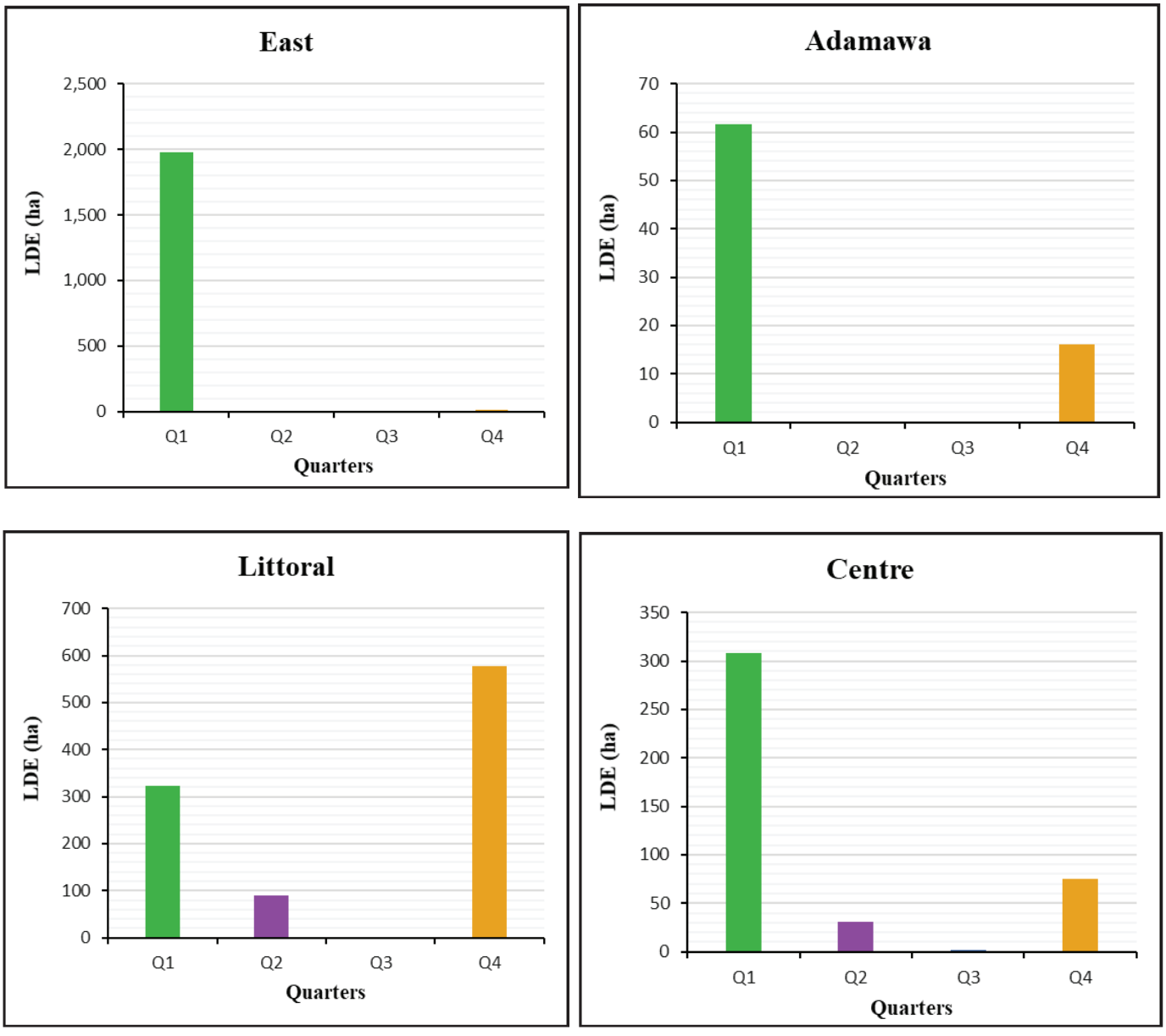
Image A (Sentinel 2, May 2019), shows the forest and Agro-industrial plantation as they were before the present alert traces. In image B (Sentinel 2, January 2020), the traces of the expansion of the said plantation and reduction of the forest are visible with the geo-location coordinates of some of the alerts in Table 3.

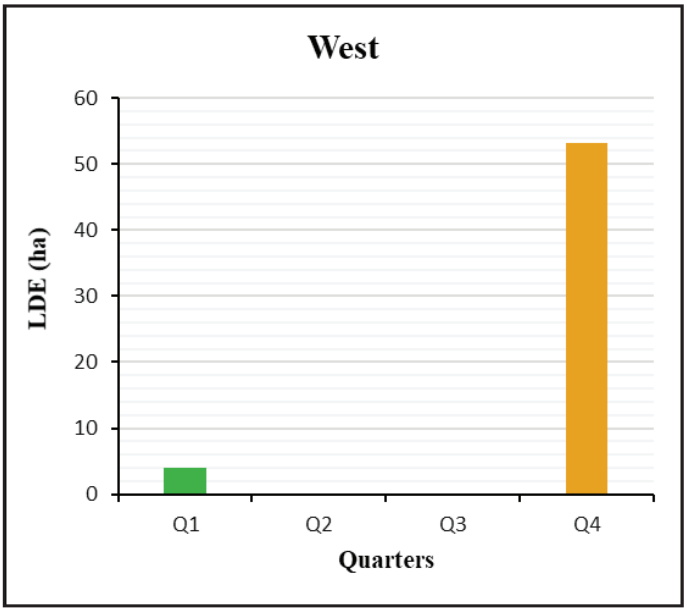
Table 3 : Geo-location coordinates of some alerts (decimal degree)

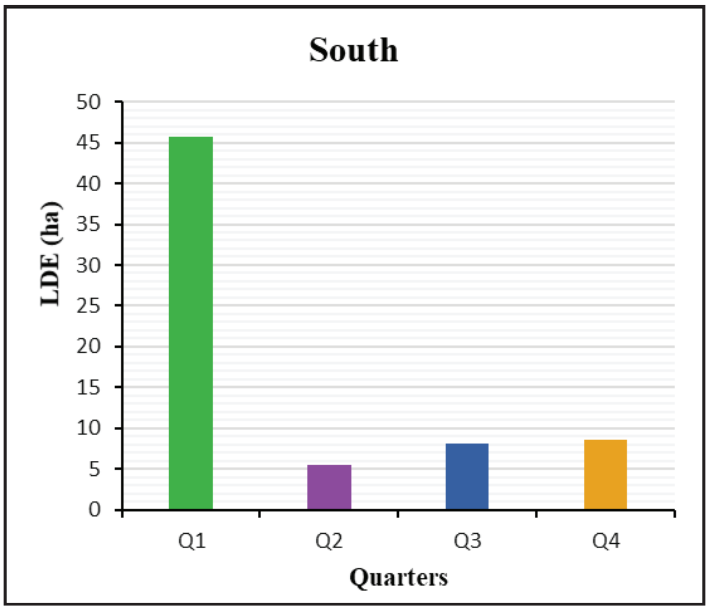
ID	X_Coord (Longitude)	Y_Coord (Latitude)
1	9.991875	4.259125
2	10.00663	4.268875
3	10.00538	4.267375

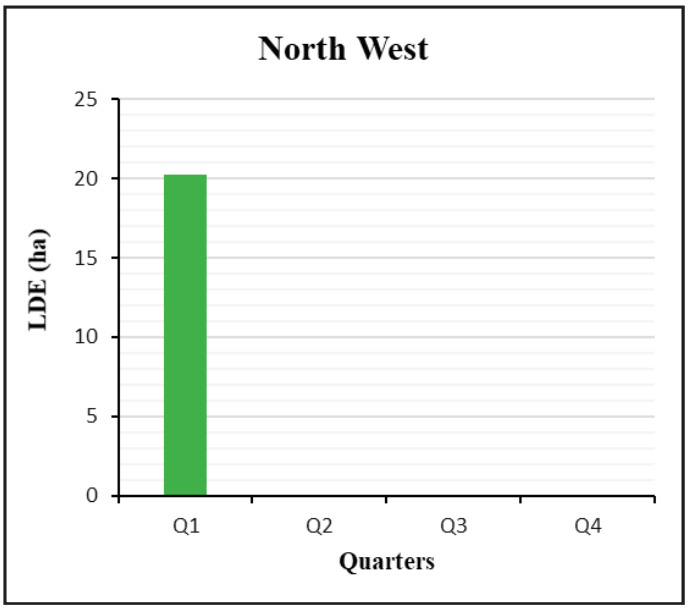
Bearing in mind that change in season influences the presence of alert signs, an analysis of forest cover changes by Region is necessary in that it helps highlight the periods of appearance of alerts corresponding to LDEs as shown in the following histograms (Figure 7).

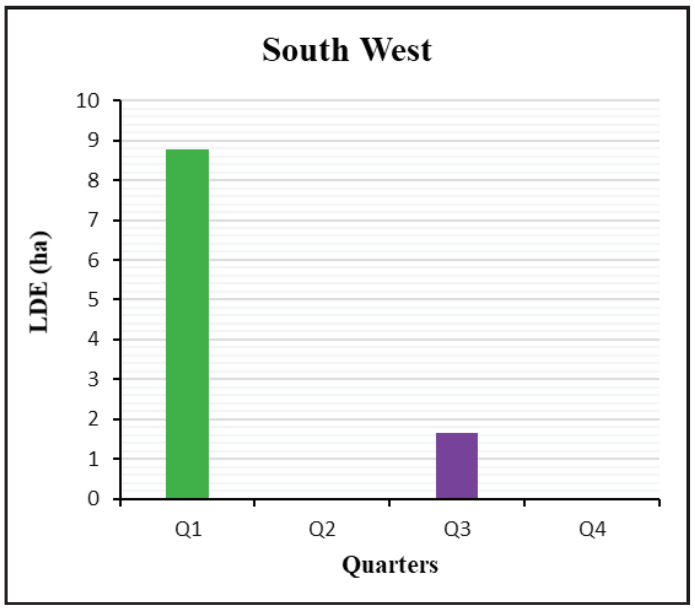
Figure 7 : Areas of LDEs by Region and for each quarter.











From these histograms, it can be seen that the first quarter (Q1) from January to March and the last quarter (Q4) covering the months of October to December 2019, represent periods of the most significant forest loss in all Regions with LDEs. As a result, 2,744.77 ha of deforested areas were identified in Q1 and 744.69 ha in Q4 (Appendix 1). These quarters correspond to the periods of the dry season, which is conducive for forestry and agricultural activities. On the other hand, from April to September, corresponding to the second (Q2) and third (Q3) quarters, alert traces detected are not significant because it is the flood period, a limiting factor for access to forests.

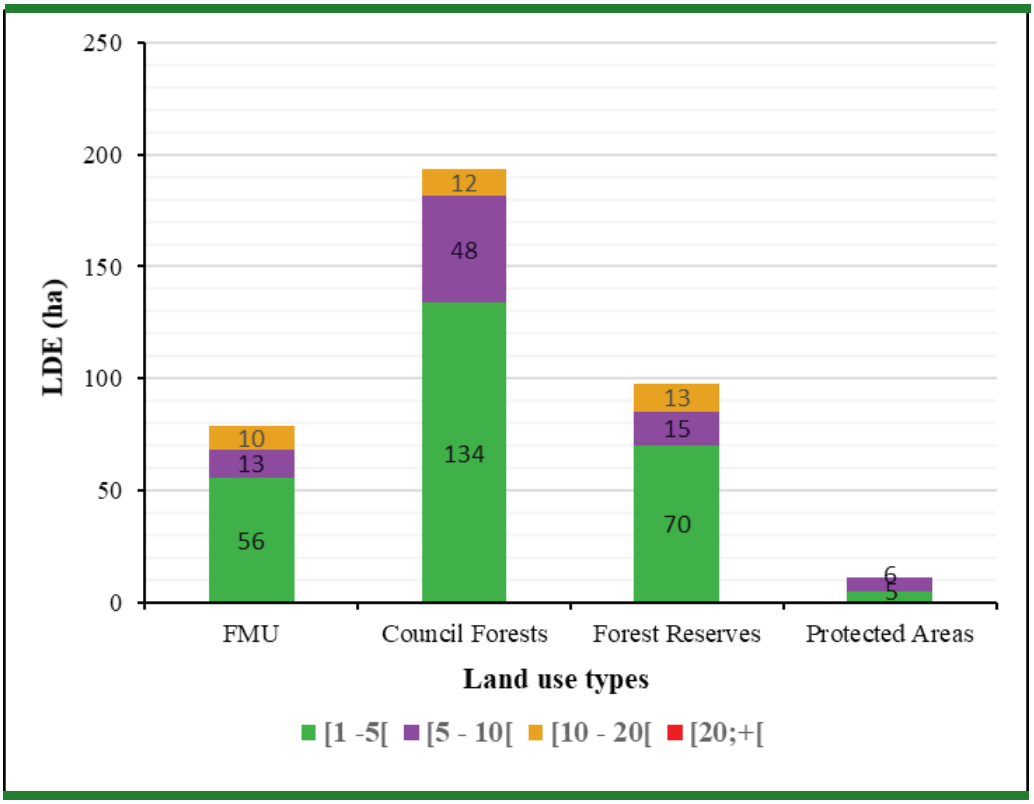
2.2. Landmark deforestation events within concessions

In accordance with Section 20 of Law No. 94/01 of 20 January 1994 to lay down Forestry, Wildlife and Fisheries Regulations, (1) Cameroon's national forest estate comprises the Permanent Forest Estate (PFE) and Non-Permanent Forest Estate (NPFD) as presented in Appendix 5.

2.2.1. Permanent forest estate

The permanent forest estate is made up of land permanently allocated to forests and/or wildlife habitat. Forests in this category are subject to disturbances that cause deforestation (Figure 8).

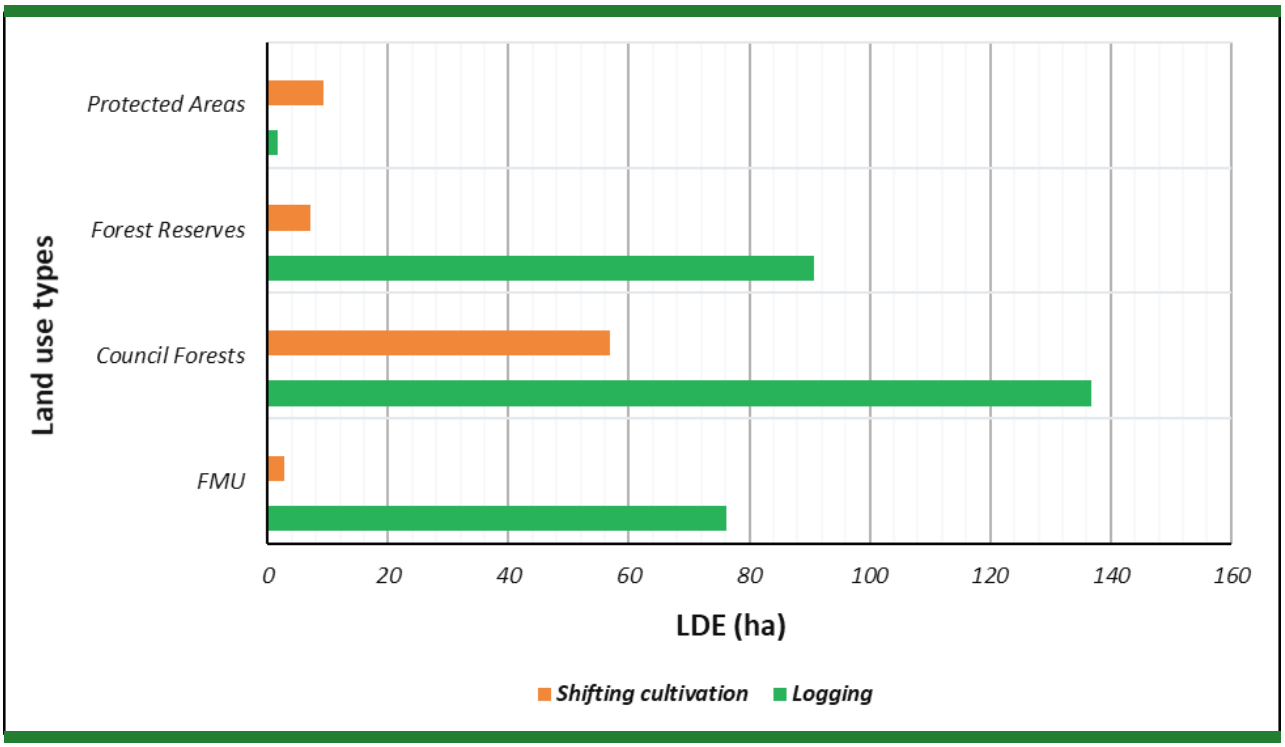
Figure 8 : LDEs in the PFE.



Council forests are more exposed with the presence of extensive affected areas. Deforested areas cover approximately 193.47 ha, i.e. 50.78% of forest concessions of the same category (Appendix 2). In the same vein, Forest Management Units (FMUs) are also impacted by human activities. Both types of forest concessions are used for timber harvesting operations that regularly cause canopy loss and thus trigger alerts. As concerns Protected Areas and forest reserves, which are integrally protected forests, clearings corresponding to LDE dimensions of 10.87 ha and 97.78 ha, respectively, were detected. This suggests that there are remote villages in some of the forests in this category, since people are constantly looking for land for their subsistence.

Forests of the PFE are confronted with natural hazards and daily human activities. Beyond the identification and categorisation of LDEs per land use type, these forests are regularly subjected to the influence and threats due to the drivers that increase the area of forest cover lost. Verification on high-resolution images and field missions made it possible to clearly identify drivers of deforestation (Figure 9).

Figure 9 : Drivers of deforestation in the PFE.



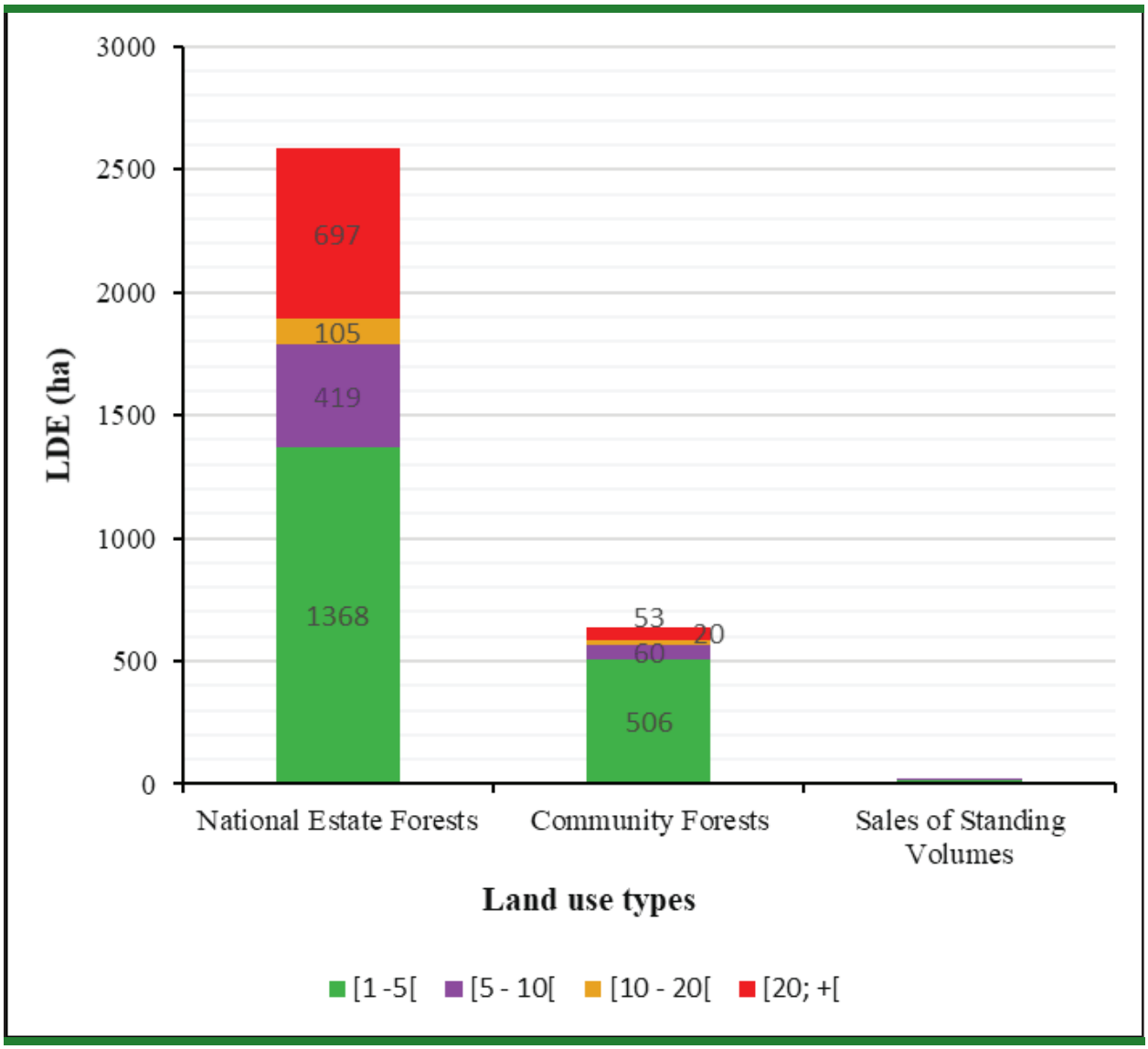
Activities authorised in FMUs and council forests are timber exploitation activities and the collection of non-timber forest products (NTFPs) by locals in the exercise of their use rights. Despite efforts made to sustainably manage these concessions, areas occupied by agricultural plantations were detected, which is in violation of the forestry regulations in force. Created plantations of more than 1 ha (LDE) were seen in FMUs 08-003 and 13-001. In the case of the Ngaoundal, Nguelememendouka-Doumaintang, Nkondjock and Yabassi Council Forests, signs of canopy loss due to farming were also noticed. A public notice was issued to declare these forested areas as reserves.

As for Protected Areas such as the Bakossi, Douala-Edea and Tchabal Mbabo National Parks and in some unnamed forest reserves in the Centre and South Regions, signals of deforestation due to agricultural activities and harvesting of timber were detected. Bearing in mind that these are integrally protected forest concessions, MINFOF staff should be made aware of the need for greater vigilance in order to step up protection actions in this category of concessions.

2.2.2. Non permanent forest estate.

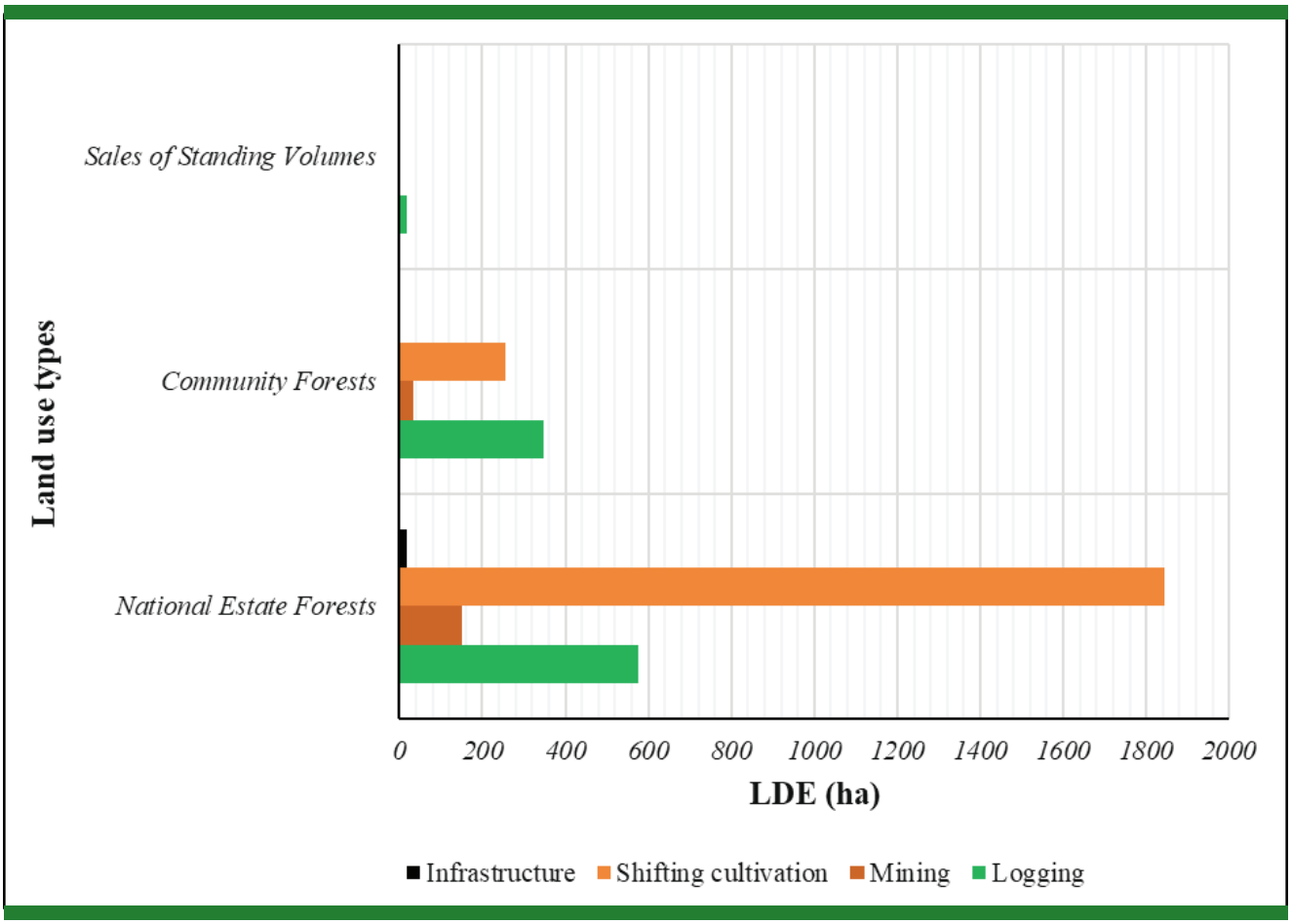
The non permanent forest estate is made up of forest land that can be allocated to non-forest uses. GLAD alerts corresponding to LDEs were detected in many of these areas (Figure 10).

Figure 10 : LDEs in the NPFE.



More deforestation effects were detected in national estate forests, which do not include orchards and plantations, fallow land, woodlands that are ancillary to agricultural holdings, or pastoral or agro-forestry schemes. However, after the forest cover bounces back, former fallow land and agricultural or pastoral land, which was under no title deed, may be considered as forests in the national estate and managed as such. These represent 80% of the surface areas corresponding to LDEs in the majority of areas of more than 20 ha, compared to the other concessions of the same category. In the community forests, an area of 639.46 ha was assessed, mainly affected by illegal timber harvesting operations and the creation of small holder farms as shown in Figure 11.

Figure 11 : Drivers of deforestation in NPFE.



In the entire non-permanent forest estate, agriculture is the main deforestation driver with a proportion of 58% (Appendix 4). These clearings are done by smallholders working on small areas but whose impact becomes significant because they are highly concentrated in some places. LDEs were detected in areas where already established agro-industries carried out works to expand the area they occupy. The second identified driver of deforestation is logging, with 26%. Mining affects 5.11% of areas showing LDEs. The implementation of infrastructure development projects caused damage to less than 1% of NPFE forests. These major infrastructure development projects include, among others, the Lom Pangar Water Development works and the Bini à Warak Hydroelectric Dam, works on the rural section of the Yaounde-Nsimalen highway, and the Yaounde-Douala highway on a stretch of the first phase Yaounde-Bibodi, the connection of water pipes of the Potable Water Supply Project for Yaounde and its environs (PAEPYS).

Photo credit: WRI

CONCLUSION

At the end of deliberations to assess changes in forest cover in Cameroon based on Landmark Deforestation Events, it was revealed that 3628.61 ha of forests were deforested in 2019. Of this area, 89.5% is found in the NPFE as against 10.5% in the PFE. All causes of deforestation are due to human activities. Of these, 60% were caused by agriculture (subsistence or industrial), which remains the main cause of forest cover loss nationwide regardless of land use category. As for logging activities, they cause 34.45% of disturbances on the overall encroached and lost forest areas.

In all regions of Cameroon, as was observed during our field missions, Quarters 1 (January to March) and 4 (October to November) represent the most significant periods of forest cover loss. Despite the efforts made, this report is limited by several factors that need to be well grasped when preparing the 2020 Report on deforestation in Cameroon. This report concludes, based on LDEs in 2019, that the deforestation rate is 0.0168% in relation to the surface area of Cameroon forests. As concerns the Permanent Forest Estate, the deforestation rate stands at 0.0027%.

DIFFICULTIES

Data collection and analysis for the drafting of this report met with a number of difficulties, including:

- Poor quality of satellite images due to cloud cover in Cameroon's coastal areas (Ocean Division, Littoral and South West Regions) which may occasion bias in findings.
- Poor appraisal of the causes of deforestation, which can lead to confusion about the deforestation driver that produces this effect.

RECOMMENDATIONS

Considering the difficulties mentioned above, and in view of the resulting analyses and interpretations, it is recommended that MINFOF:

- Plan to conduct a more in-depth study on deforestation in Cameroon's Permanent Forest Estate.
- Set up a permanent monitoring system in real time, making it possible to detect alerts in the entire National Forest Estate with special attention to the Permanent Forest Estate.
- Propose suitable measures to limit the creation of farms in production forests of the PFE (FMUs and Council Forests).
- Step up monitoring actions in integrally protected concessions (forest reserves and Protected Areas) in order to do away with all human activity in accordance with the regulations in force.

It was also recommended that WRI:

- Encourage verification missions to confirm the drivers of deforestation and carry out a full-fledged study on the major driver, which is subsistence agriculture.
- Propose a deforestation alert algorithm based on high-resolution satellite images.

APPENDIX

Appendix 1 : Recap of Surface areas for LDEs for each Quarter.

Regions	Surface area of LDEs per Quarter (ha)			
	T1	T2	T3	T4
Adamawa	61.64	0	0	16.12
Centre	308.22	30.94	1.45	75.02
East	1 974.28	0	0	13.24
Littoral	321.85	89.38	2.10	578.51
North-West	20.27	0	0	0
West	4.07	0	0	53.17
South	45.67	5.47	8.15	8.63
South-West	8.77	0	1.65	0
Total	**2 744.77**	**125.79**	**13.35**	**744.69**

Appendix 2 : Recap of Surface areas of LDEs by class in the PFE.

PFE	Surface areas of LDEs by class (ha)				Total
	[1 -5[	[5 - 10[	[10 - 20[	[20; + [	
FMU	55.66	12.80	10.45	0	78.92
Council Forests	133.85	47.78	11.84	0	193.47
Forests Reserves	70.36	14.86	12.56	0	97.78
Protected Areas	4.72	6.14	0	0	10.87
TOTAL					**381.03**

Appendix 3 : Recap of Surface areas of LDEs by class in the NPFE.

NPFE	Surface areas of LDEs by class (ha)				Total
	[1 -5[	[5 - 10[	[10 - 20[	[20; + [	
National Estate Forests	1 368.06	419.18	105.18	696.54	2 588.98
Community Forests	506.31	60.02	19.80	53.34	639.46
Sales of Standing Volumes	13.99	5.15	0	0	19.14
TOTAL					**3 247.58**

Appendix 4 : Recap of deforested areas for each driver per land use type.

Types of estate	Land use type	Moteurs de déforestation			
		Logging	Mining	Shifting cultivation	Infrastructure
PFE	FMU	76.24	0	2.67	0
	Council Forests	136.71	0	56.75	0
	Forest Reserves	90.69	0	7.09	0
	Protected Areas	1.65	0	9.22	0
NPFE	National Estate Forests	576.66	150.76	1845.33	16.22
	Community Forests	348.99	34.70	255.77	0
	Sales of Standing Volumes	19.14	0	0	0
TOTAL		**1 250.08**	**185.46**	**2176.84**	**16.22**

Appendix 5 : Structure of Cameroon's Forest Estate

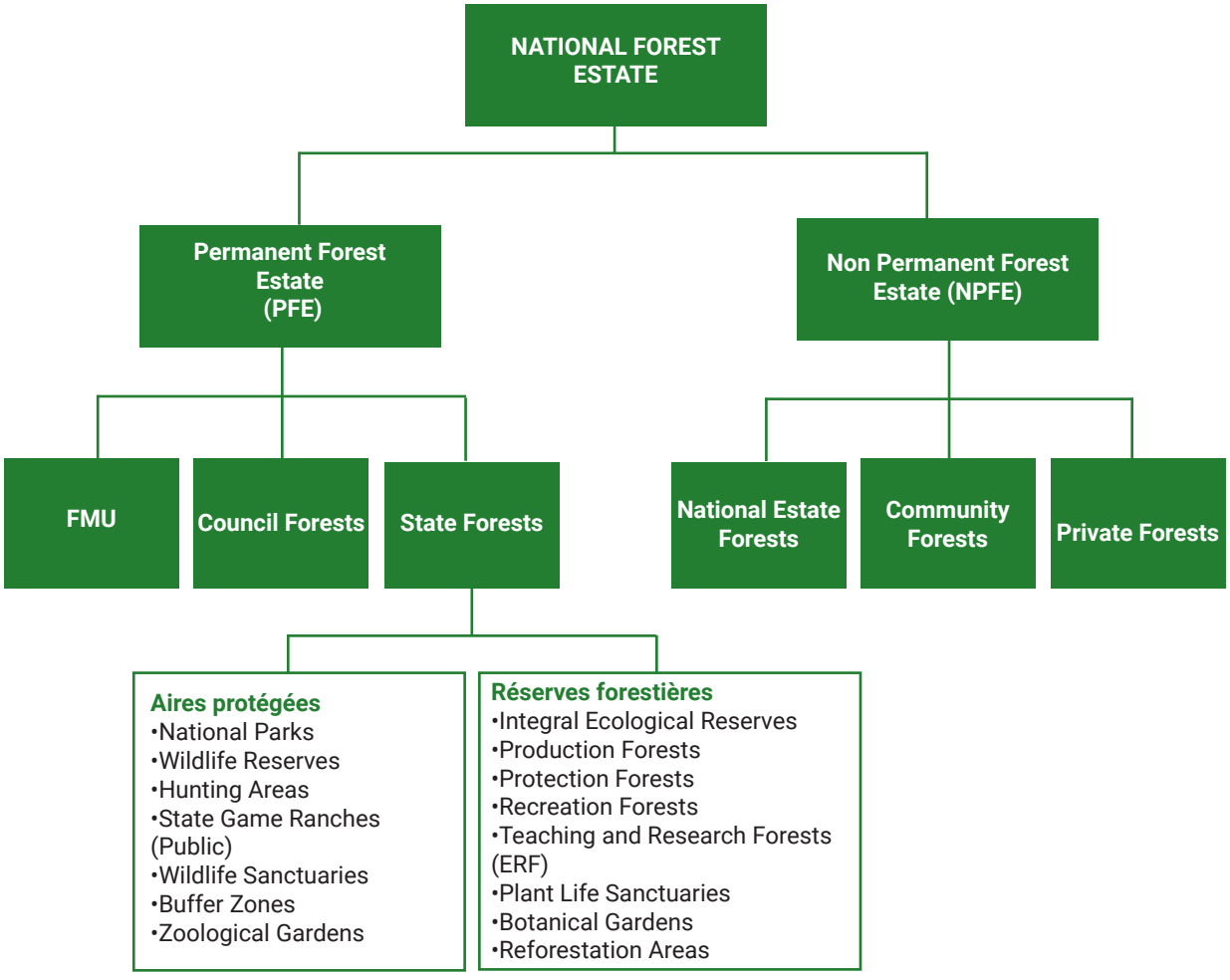


Photo credit: WRI

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