



GLAD ALERTS NEWSLETTER: 1st Quarter 2018



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REPUBLIC OF CAMEROON

MINISTERE DES FORETS ET DE LA FAUNE
MINISTRY OF FORESTRY AND WILDLIFE



MINISTERE DE L'ENVIRONNEMENT,
DE LA PROTECTION DE LA NATURE
ET DU DEVELOPPEMENT DURABLE
MINISTRY OF ENVIRONMENT, PROTECTION OF
NATURE AND SUSTAINABLE DEVELOPMENT

GLAD ALERTS NEWSLETTER

1ST QUARTER 2018



WORLD
RESOURCES
INSTITUTE

FOREWORD



Jules Doret NDONGO
Minister of Forestry and Wildlife

This is the maiden issue of the GLAD (Global Land Analysis and Discovery) alerts quarterly Newsletter published by the Operational Unit for Forest Cover Monitoring (UOSCF), which was set up by Order No 0086/MINFOF/C2D-PROPSFE2 of 18 May 2016.

With satellite images of forest cover changes in Cameroon, this publication directly addresses modern sustainable management requirements. 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.

This specialised publication draws 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 the scientific contribution made to our sector of activity. The Institute's development services, as well as the production and publication of the Forestry

Atlas of Cameroon online are recognised and dedicated actions.

One of the priorities of UOSCF, whose assigned mission is to conduct time-series monitoring per geo-ecological area, is using these alerts for quarterly reporting of forest cover changes. It is our hope that institutional and private partners, researchers and research institutes, the prime targets of this publication, would be able to factor in the information contained herein.

The Ministry faces the challenge of sustaining the production and publication of this invaluable Newsletter, a real institutional action guidance tool in orienting the strategy to combat illegal logging, enhancing reforestation, land use and sustainable forest management, as well as clearly outlining the missions of the Operational Unit in future institutional development initiatives.

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SUMMARY

To ensure sustainable management of resources and forest ecosystems, the Cameroon Government took a number of national and international commitments. In furtherance thereof, the Operational Unit for Forest Cover Monitoring (UOSF), under the supervisory authority of MINFOF, was set up by Order N° 0086/MINFOF/C2D-PROPSFE2 of 18 May 2016.

Within the framework of its technical assistance to MINFOF, World Resources Institute contributed in producing and publishing the Forestry Atlas of Cameroon online. The Atlas considers GLAD (Global Land Analysis and Discovery) alerts developed by the University of Maryland on forest cover dynamics. One of the priorities of UOSCF is to use these alerts for quarterly forest cover monitoring reporting. WRI provides assistance to UOSCF in using this tool.

This newsletter aims, overall, to present trends in forest cover change in Cameroon during the 1st quarter of 2018 using GLAD alerts. Specifically, it shows time series alert trends per region, alert trends per land use type and the major drivers of forest cover change nationwide. Furthermore, the GLAD alerts Newsletter aims to facilitate forestry control, contribute in identifying forest cover loss drivers and estimating national carbon emission/absorption rates, guide land use strategies and identify degraded areas to help make informed choices of sites to be reforested.

On the whole, the method involved digitizing and validating alert areas by photo-interpretation of mostly Sentinel 2 and at times Quickbird time-series satellite images.

Alerts are changes in pixel reflectance and this study focuses only on forest cover loss. Analyses were validated in two phases: a first phase by the Technical Working Group for the production of quarterly newsletters on GLAD alerts, and the second phase by the Guidance, Monitoring and Validation Panel.

The results show that in the 1st quarter of 2018, forest cover loss was driven at national level in descending order by: seasonal farming (38%), infrastructure (29%), community forests (10%), mining (8%), FMUs (4%), council forests (4%), agribusiness (3%), logging in non-certified timber concessions (2%), sales of standing volumes (1%) and others (1%). Agriculture alone accounts for 41 % of forest cover loss. In fact, the first quarter coincides with the dry season when farms are prepared for planting in March, clearing and felling having been done from December to January, and burns in February for smallholder farmers. Thus, 95% of alerts occurred in the non-permanent estate as against 5% in the permanent estate. 3.75 % of these were due to logging in non-certified timber concessions as against 5 % in certified timber concessions and less than 1 % in buffer zones in the vicinity of Protected Areas. Agriculture is the main driver of forest cover loss at national level. However, field missions will help confirm and better these results.

We look forward to publishing Newsletters for the remaining three quarters of 2018.

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LIST OF ABBREVIATIONS AND ACRONYMS

AFR 100	African Forest Landscape Restoration Initiative
CF	Council Forests
ComF	Community Forests
ENEF	National Forestry School
FAO	Food and Agriculture Organization
FESP BF	Forest Environment Sector Programme Basket Fund
FMU	Forest Management Unit
GESP	Growth and Employment Strategy Paper
GFW	Global Forest Watch
GHGI	Greenhouse Gas Inventory
GIS	Geographic Information System
GLAD	Global Land Analysis and Discovery
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
MINEPDED	Ministry of Environment, Protection of Nature and Sustainable Development
MINEPAT	Ministry of the Economy, Planning and Regional Development
MINFOF	Ministry of Forestry and Wildlife
ONACC	National Observatory on Climate Change
OSM	Open Street Map
PA	Protected Area
PI	Photo Interpretation
REDD+	Reducing emissions from deforestation and forest degradation, conservation of carbon stocks of forest, sustainable forest management and enhancement of forest carbon stocks
RIFFEAC	Africa Forestry and Environment Training Institutions Network
SSV	Sales of Standing Volumes
TFP	Technical and Financial Partners
UMD	University of Maryland
UNFCCC	United Nations Framework Convention on Climate Change
UORCAF	Operational Unit for Capacity Building on Forest Management
UOSCF	Operational Unit for Forest Cover Monitoring (UOSCF)
USFS	U.S. Forestry Service
VPA-FLEGT	Voluntary Partnership Agreement-Forest Law Enforcement Governance and Trade
WRI	World Resources Institute

DEFINITION OF CONCEPTS

Forest

Forestry Law 94/01 of 20 January 1994 to lay down forestry, wildlife and fishery regulations in Cameroon defines forest as “.... any land covered by vegetation with a predominance of trees, shrubs and other species capable of providing products other than agricultural produce.”

The FAO on its part defines forest as “... a minimum area of land of 0.5 hectares with a tree crown cover of more than 10% and trees with the potential to reach a minimum height of 5 meters at maturity in situ.»

In 2015, the Ministry of the Environment, Protection of Nature and Sustainable Development (MINEPDED) within the framework of the REDD+ process in Cameroon, adopted the following definition: “Forests mean lands with a tree or shrub-based vegetation cover, with a minimum surface area of 0.5 ha comprising a vegetation where trees and shrubs cover more than 10 % and may at maturity reach a height of 3 m. This excludes single-crop agribusiness plantations for purely economic purposes, and which basically employ agriculture management techniques. Forests also mean former forest areas that have been affected by natural disturbances (e.g. earthquakes, volcanic eruptions, tornadoes, fires...) that led to a depletion of their canopy to less than 10% and which are likely to bounce back.”

However, the Global Forest Watch (GFW) platform used in monitoring GLAD alerts uses algorithms based on the following parameters: 30% as minimum tree cover density, 1 ha as minimum surface area and 5 m as minimum tree height.

Deforestation

In the context of REDD+, it is the direct human-induced change from a forest to a non-forest state

Degradation

In the context of REDD+, degradation means human-induced changes occurring in the forest, which negatively impact the structure or function of the forest stand or site, thus reducing carbon stocks and the capacity of the forest to deliver ecosystem products and/or services.

GLAD Alerts

An alert is defined as any Landsat image pixel that experiences a canopy loss 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 supported by Global Forest Watch for monitoring of forest cover dynamics. These are Landsat-based image alerts of a 30-metre spatial resolution and can detect changes at a much finer spatial scale.

To ensure sustainable management of natural resources and forest ecosystems, the Cameroon Government took a number of national and international commitments, which include, amongst others:-Sustainable management of production forests;

- The African Forest Landscape Restoration Initiative (AFR 100);
- Reducing Emissions from Deforestation and Forest Degradation (REDD+)

In the furtherance of these commitments, the Operational Unit for Forest Cover Monitoring (UOSCF), under the supervisory authority of MINFOF, was set up by Order N° 0086/MIN-FOF/C2D-PROPSFE2 of 18 May 2016.

As part of the Collaboration Convention concluded between MINFOF and World Resources Institute (WRI), WRI has, through MINFOF, been providing technical support to the Cameroon Government since the year 2000, in producing, updating and publishing the Forestry Atlas of Cameroon online. GLAD Alerts generated by the University of Maryland on trends in forest cover changes, are included in the web platform of the Forestry Atlas of Cameroon. One of the priorities of UOSCF is to use these alerts for quarterly forest cover monitoring reporting. WRI is thus committed to backing the team in using the tool to implement sustainable forest resources management and good governance strategies.

This Newsletter aims, overall, to present trends in forest cover change in Cameroon using GLAD alerts.

Specifically, it shall report time series alert trends per region, alert trends for each land use type and the major drivers of forest cover change nationwide.

The GLAD alerts Newsletter aims to facilitate forestry control, contribute in identifying forest cover loss drivers and estimating national levels of carbon emission/absorption, orientate land use strategies and identify degraded areas to help make informed choices about sites to be reforested.

2. Presentation of UOSCF

2.1. Set up

UOSCF was set up by Order N° 0086 of 18 May 2016 with the main missions of collecting, processing, archiving and making available satellite images, forest survey information and other spatial information. The goal here is forest cover and environmental change monitoring in Cameroon in conjunction with REDD +.

2.2 Missions

The missions of UOSCF are focused on the following areas:

- Developing partnerships with sub-regional and international space agencies;
- Collecting, processing and archiving satellite images depending on user needs;
- Managing the geodatabase of forestry and environmental data generated;
- Managing the geo-referenced data transmission geoportal;
- Providing the relevant Services, mainly the central services of MINFOF and MINEPDED, with images;
- Coordinating the thematic Working Group on geomatics and remote sensing in collaboration with RIFFEAC, universities and other partner institutions;
- Working in close collaboration with UORCAF and ENEF, the MRV Unit of REDD+ TS, the Sub-department for Ecological and Climate Monitoring at MINEPDED and ONACC in order to generate GHGI data and foster IPCC good practices in the inventory of greenhouse effect gases in the forestry sector.

2.3 Ambitions

UOSCF looks forward to providing data on deforested and degraded forest areas as part of REDD+, regularly produce the quarterly newsletter on forest cover changes (gain and loss), as well as an atlas of forest cover changes.

3. Organisation of work

3.1. Technical working group

Set up by service memo No 0289/NS/MIN-FOF/SETAT/SG/C2D-PSFE2/CNA/RTV1.3/UOSCF of 3 August 2018, the working group responsible for producing the quarterly GLAD Alerts Newsletter was, for 365 calendar days as from 1 January 2018, tasked to prepare and produce quarterly GLAD Alert Newsletters with technical, logistic and financial support from WRI.

3.2. Guidance, Monitoring and Validation Panel

Service memo No 0290/NS/MIN-FOF/SETAT/SG/C2D-PSFE2/CNA/RTV1.3/UOSCF of 3 August 2018 appointed members of the monitoring panel with the mandate to oversee the production and validation of quarterly GLAD Alerts Newsletters produced by the technical team set up for that purpose. The said panel meets quarterly at the behest of its chairperson. It is expected, at the end of its deliberations, to forward a quarterly GLAD Alerts validation report to the Minister of Forestry and Wildlife within 72 hours following the end of deliberations.

4. Overview of forestry control

Forestry control in Cameroon is regulated by the March 2005 National Forestry Control Strategy. The strategy takes into account various related instruments: the forestry policy adopted in 1993, the forestry law enacted in 1994, the 1996 framework law on the environment, the 1999 Yaounde Declaration, VPA-FLEGT, the 2002 Poverty Reduction Strategy Paper, the 2010 Growth and Employment Strategy Paper (GESP), etc.

4.1. Objective of forestry control

Forestry control aims to curb illegal exploitation of forest resources, promote sustainable management, governance and resource value chains. In Cameroon, controllers take action in conjunction with officials of other Services. They keep abreast of regulatory instruments of other fields that influence national forestry control strategy implementation.

4.2. Types of forestry controls

In practice, forestry control is guided by the Forestry Controller's Handbook tailored to the National Forestry Control Strategy and VPA-

FLEGT legality matrix requirements. There are three types of controls: programmed controls, routine controls and unannounced controls.

4.3. Mapping tools for forestry control

Mapping tools are necessary for forestry control. Mapping tools in general and GLAD alerts in particular can help:

- Locate cleared areas in the permanent or national forest estate;
- Provide information on the period when logging activities took place at a given site;
- Monitor the progress of large-scale activities within and without a certified concession (felling, reforestation, park creation, road construction, building of living quarters, etc.);
- Guide controllers towards ecologically fragile zones impacted by logging (water bodies, slopes, etc.);
- Generate exploitation indices of protected species;
- Detect errors in delineating certified concessions or fraudulent delineation

5. Forest cover monitoring tools

5.1. Platforms

The interactive Forestry Atlas of Cameroon is a dynamic forest monitoring system that provides reliable, up-to-date forestry sector information. It is based on the GIS (Geographic Information System) platform and aims at enhancing forest management and land use planning, bringing together on the same standardised platform information on the major land use categories. The Forestry Atlas provides key data on forest management, together with data on the extent of forest cover changes provided by the Global Forest Watch (GFW) near real-time monitoring system.

The GFW platform has a mobile version, Forest Watcher, which can function with a smartphone and allow for data collection offline.

5.2. Satellite imagery data

- This dataset created by the Global Land Analysis and Discovery (GLAD) laboratory of the University of Maryland and suppor-

ted by Global Forest Watch, is the pioneer Landsat-based imagery alert system for detecting tree cover loss. While most cover loss alert products use MODIS satellite images of a 250-metre resolution, these alerts have a 30-metre resolution and can consequently detect loss at a finer spatial scale.

- As such, GLAD alerts can provide the first indication in areas where forest loss may be ongoing. GLAD alerts have the advantage that they can:
- Rapidly spark alerts on new change areas in a cost effective manner, especially in remote, hard-to-reach regions not easily accessible by patrols.
- Indicate spatial allocation of resources, including prioritising zoning verifications and field investigations;
- Provide additional evidence to corroborate information on illegal logging.

6. Materials and method

The first step of the methodology involved downloading alerts on the GFW web platform. Thereafter, alert hotspots confirmed during the first quarter of 2018 were digitally recorded and validated by photo-interpretation of Sentinel 2 time-series satellite images for most of them, and Quickbird. Processing of remotely sensed Landsat images (quality control, radiometric standardisation and classification) had been previously done by GFW.

6.1. Materials

Materials basically included GLAD alerts, satellite data, land use data and other exogenous data.

→ GLAD Alerts

Our study defines alerts as changes in pixel reflectance, and only forest cover loss was considered, that is, changes of the forest cover from a forest to a non-forest state or from forest to degraded forest. GLAD alerts from January to March 2018 were downloaded from the website: <http://glad-forest-alert.appspot.com>.

→ Satellite data

High resolution and very high resolution satellite images covering the period running from December 2017 to April 2018 were used in this study. They include Sentinel 2 and Quickbird satellite images of a 10-metre and a 0.5-metre

resolution respectively. Virtually all of Cameroon was covered by just Sentinel 2 images, which were downloaded from the website: <https://remotepixel.ca> and QuickBird images from the Digital Globe web platform: <https://evwhs.digitalglobe.com>.

→ Land use data

Land use data was drawn from the database of the Forestry Atlas of Cameroon, produced by MINFOF and WRI (2018). These include shapefiles of administrative boundaries of Cameroon, infrastructure (roads, dams...), Forest Management Units (FMUs), Council Forests (CF), Sales of Standing Volumes (SSV), Protected Areas (PAs), Community Forests (ComF)...

→ Exogenous data

Topographic data from the National Institute of Cartography, Google Earth and Open Street Map were also used to interpret and describe alerts.

→ Software

Photo-interpretation, validation of alerts, extraction of forest cover loss areas and maps were made with ArcGIS desktop 10.6 software. Excel 2016 software was used for digital calculations and graphic representations of results.

6.2. Extraction and analysis of alerts

Alerts were downloaded as raster data, then converted to vector data and reclassified by calendar day, month and quarter. They were analysed by photo-interpretation (PI), which involves superimposing time series images on alerts and digitizing land change areas observed.

As such, UOSCF team observed forest cover dynamics in each administrative region of Cameroon on multi-temporal scenes (December 2017 to March 2018) and recorded the observation results in a database. The said database was supposed to have information on the parameters of each digitized polygon representing an alert or alert event (group of alerts). The parameters include: land use, type of cover before and after the alert, description of change event, surface area, availability, date and name of image used for PI, the certified forest concession in which the alert occurred and the photograph of the alert.

6.3. Validation of analyses

Analyses were validated in two phases: a first phase by the Technical Working Group in view of producing quarterly newsletters on GLAD alerts, and the second phase by the Guidance, Monitoring and Validation Panel.

6.4. Summary of observations and forest loss drivers

Alert areas were calculated in ArcGIS desktop and data was aggregated at national level, by region, by forest estate (permanent or non-permanent), by certified and non-certified timber concession, for each change driver and per month in Excel.

Permanent Estate Forests concerned include: FMUs and Council Forests. Non-Permanent Estate Forest for their part include SSVs, Community Forests, agricultural lands (industrial, medium-size and smallholder farms) and vicinities of Protected Areas (a buffer zone of 12 km in the vicinity of PAs was considered).

7. Results

Nationwide, 44,824 confirmed alerts were registered in the first quarter of 2018, distributed per Region as follows: 11 in the Far North, 44 in the North, 3,288 in the Adamawa, 2,142 in the North West, 2,603 in the West, 385 in the South West, 1,457 in the Littoral, 7,779 in the South, 12,394 in the Centre and 14,721 in the East. Figure 1 below summarises the proportion of alerts per Region.

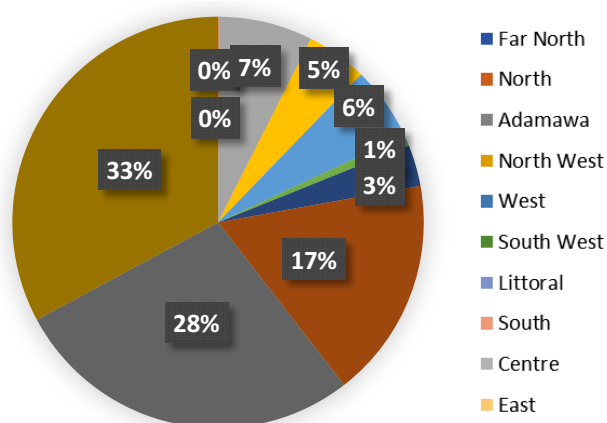


Figure 1. Proportion of alerts per region

The bulk of alerts came from the East Region (33%), Centre (28%) and South (17%), while the rest (22%) were spread over the other

Regions. Figure 2 below shows the distribution of alerts nationwide.

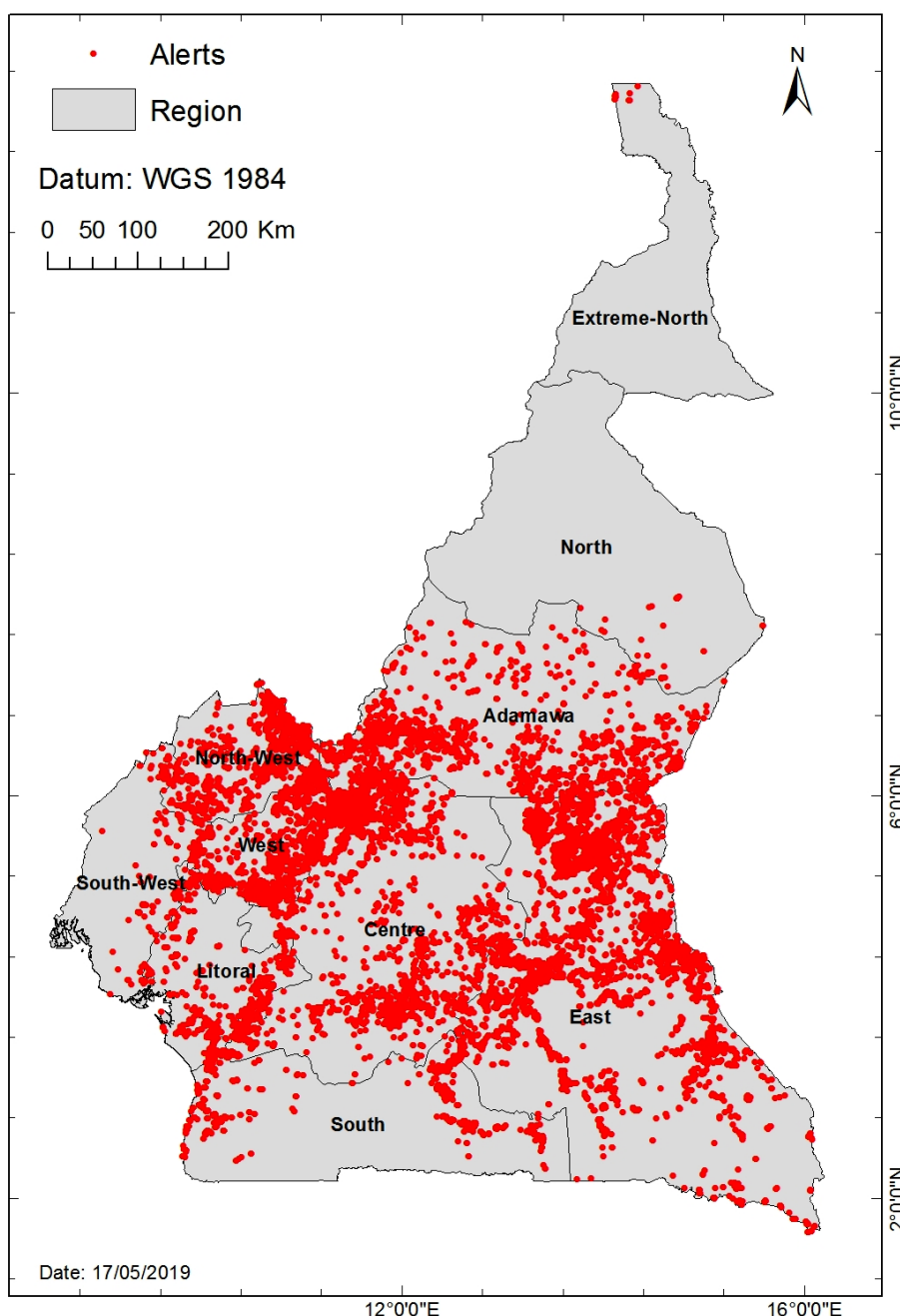


Figure 2. Map of confirmed alerts in the 1st quarter of 2018

7.1. Sequence of alert trends for each land use type per region

7.1.1. Centre Region

Loss recorded stood as follows for each land use type: 90.79 ha in Community Forests; 39.98 ha in FMUs; 22.44 ha for agribusinesses; 3.84 ha in the vicinity of Protected Areas

notably So'o Lala, Mpem & Djim and Mbam & Djerem; 2,60 ha in Council Forests; 0.52 for Sales of Standing Volumes. In non-certified timber concessions, 287.20 ha were cleared for seasonal farming; 2.87 ha for infrastructure mainly around the Nachtigal Dam area, roads and building in rural areas, and 0.84 ha for urbanisation (construction site of the Stadium in the Olembe neighbourhood in Yaounde).



Figure 3. Alerts due to urbanisation around Yaounde (Sentinel 2 Images)

Monthly results analyses reveal that in January, no loss was recorded in certified concessions, while 5.21 ha of forests were cleared in non-certified concessions for seasonal farming. Loss increased considerably in March, 318.12 ha, thus more than double the loss recorded in February (127.75 ha).

The table 1 below presents, for each certified and each non-certified timber concession, areas of cleared forests in hectares (ha) in the 1st quarter of 2018 in the Centre Region. It shows a forest cover loss of 5.211 ha in January, 127.75 ha in February and 318.12 ha in March, totalling 451.08 ha for the entire Centre Region.

Tableau 1 : Area of cleared forest (ha) per month and per land use type in the Centre Region

Land use type	January	February	March	Total	Quarterly %
Agribusinesses	0	9.57	12.87	22.44	4.97
Seasonal farming	5.21	81.39	200.60	287.20	63.67
Council Forests	0	2.60	0	2.60	0.58
Community Forests	0	31.55	59.24	90.79	20.13
FMU	0	0.24	39.74	39.98	8.86
Sales of Standing Volumes	0	0	0.52	0.52	0.12
Infrastructure	0	1.55	1.31	2.87	0.64
Vicinity of Protected Areas	0	0	3.84	3.84	0.85
Urbanisation	0	0.84	0	0.84	0.19
Total	5.21	127.75	318.12	451.08	100

It also indicates that the heaviest loss was recorded in the month of March, followed by February, as shown in figure 4 above. January recorded the lowest forest cover loss in the Region.

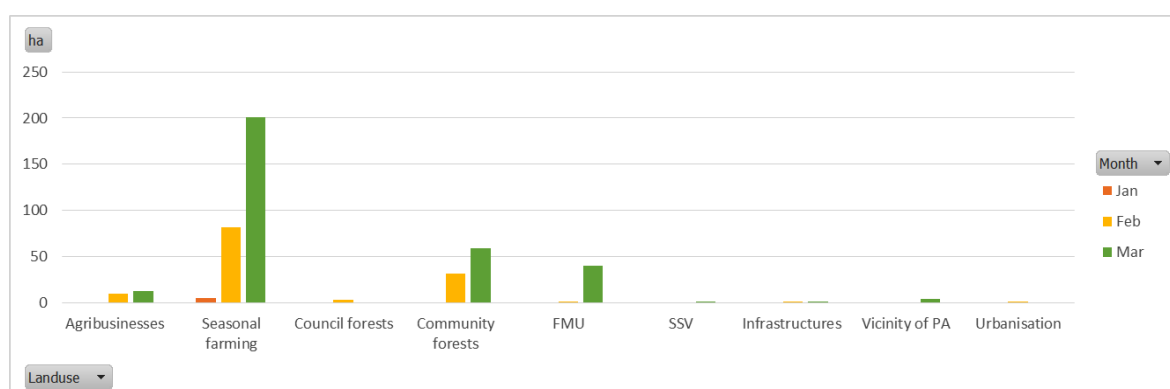


Figure 4. Area of cleared forest (ha) for each land use type per month in the Centre Region

7.1.2. East Region

In East Region, 175.27 ha of forest were cleared in January, 5.44 ha in February and 1,911.46 ha in March, for a total 2,092.16 ha. This breaks down as follows: 10.20% in Community Forests; 5.52% in Council Forests; 9.49% for Sales of Standing Volumes; 1.8%

in FMUs; 0.44% in Protection Forests such as Mia and Koboungunda; 44.87% of forests were lost owing to the implementation of major infrastructure projects, especially the Lom Pangar Dam, which led to flooding of forest areas. Other losses were due to seasonal farming (21%), mining (12.89%) and logging in non-certified timber concessions (2.84%).

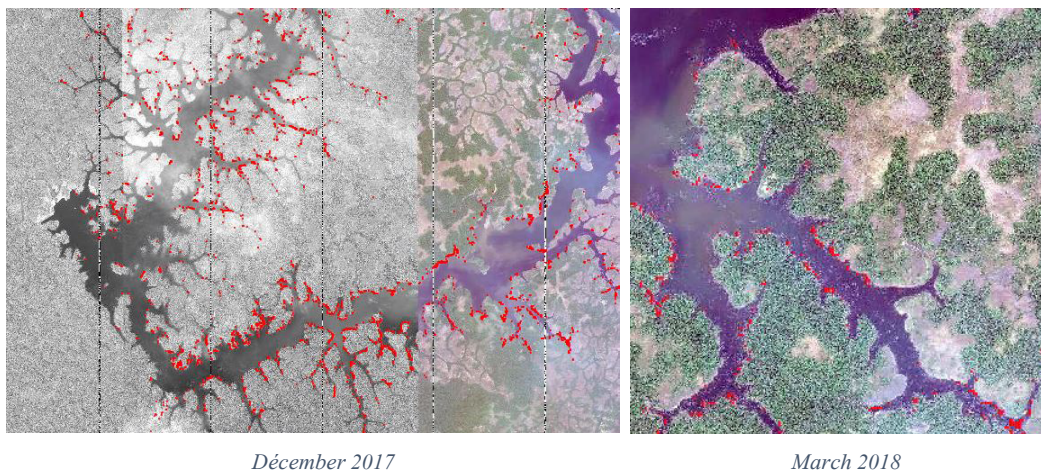


Figure 5. Alerts in the flood area of the Lom Pangar Dam (QuickBird images)

Table 2 summarises, for each certified and each non-certified timber concession, the area of cleared forest in hectares (ha) in the 1st quarter of 2018 in the East Region.

Table 2. Area of cleared forests (ha) for each land use type per month in the East Region

Land use type	January	February	March	Total	Quarterly %
Seasonal farming	22.6	0.63	415.93	439.16	20.99
FMU	4.61	0	32.98	37.58	1.80
Sales of Standing Volumes	5.05	0	4.44	9.49	0.45
Council Forests	7.54	1.78	106.21	115.53	5.52
Community Forests	21.1	1.79	190.42	213.31	10.20
Protection Forests	0	0	9.26	9.26	0.44
Dam infrastructure	0	0	938.82	938.82	44.87
Mining	109.94	1.24	158.5	269.68	12.89
Logging in non-certified timber concessions	4.43	0	54.9	59.33	2.84
Total	175.27	5.44	1911.46	2092.16	100

Forest cover loss mostly occurs in March as shown in Figure 6.

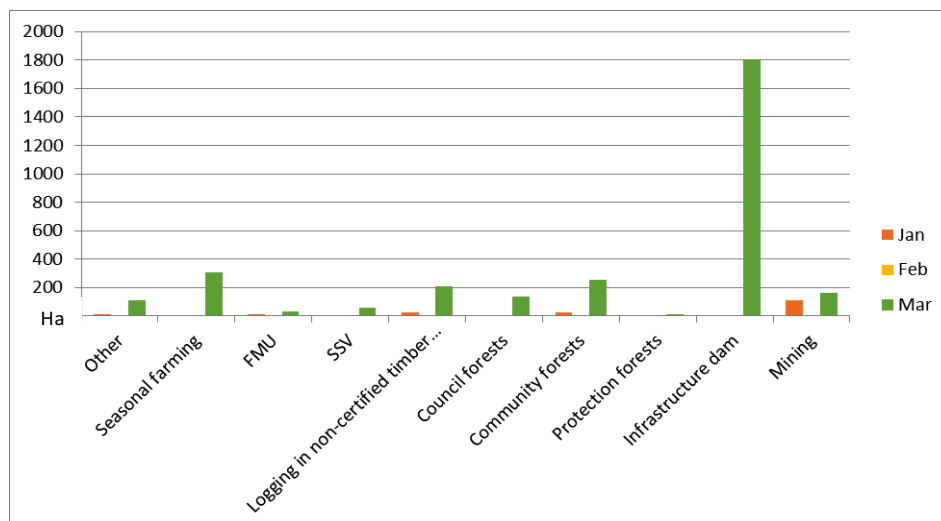


Figure 6. . Area of cleared forest (ha) for each land use type per month in the East Region

7.1.3. South Region

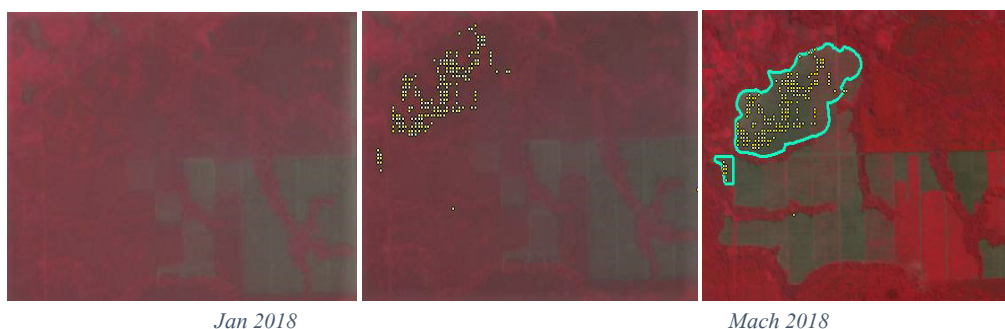


Figure 7. Alerts in an agribusiness plantation in the South Region (Sentinel 2 images)

In the South Region, there were changes over an area of 210.46 ha with peaks in March. Here, forest loss drivers identified included conversion of forests into rubber plantations

(23.19%) (Figure 7), seasonal farming (38.90%), logging in Community Forests (12.08 %) and logging in non-certified timber concessions as shown in table 3.

Tableau 3. Area of cleared forest (ha) for each land use type per month in the South Region

Land use type	January	February	March	Total	Quarterly %
Agribusinesses	2.02	0.71	46.06	48.8	23.19
Others	0	0	2.65	2.65	1.26
Seasonal farming	0	3.64	78.23	81.87	38.90
Community Forests	0	1.62	23.81	25.43	12.08
Road infrastructure	0	0	1.37	1.37	0.65
Mining	0	0	0.28	0.28	0.13
FMU	0	0	20.17	20.17	9.58
Urbanisation	0	1.18	0.69	1.88	0.89
Sales of Standing Volumes	0	0	15.82	15.82	7.52
Logging in non-certified timber concessions	0	0.48	11.72	12.2	5.80
Total	2.02	7.63	200.81	210.46	100

Figure 8 below, shows that losses were highest in March, representing about 95% (200.81 ha) of the total for the Region

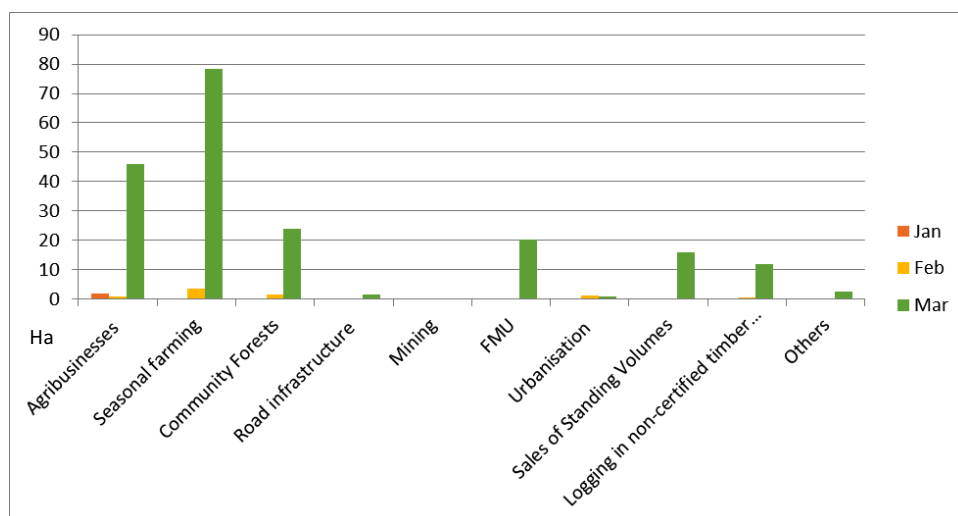


Figure 8. Area of cleared forest (ha) for each land use type per month in the South Region

7.1.4. Littoral Region

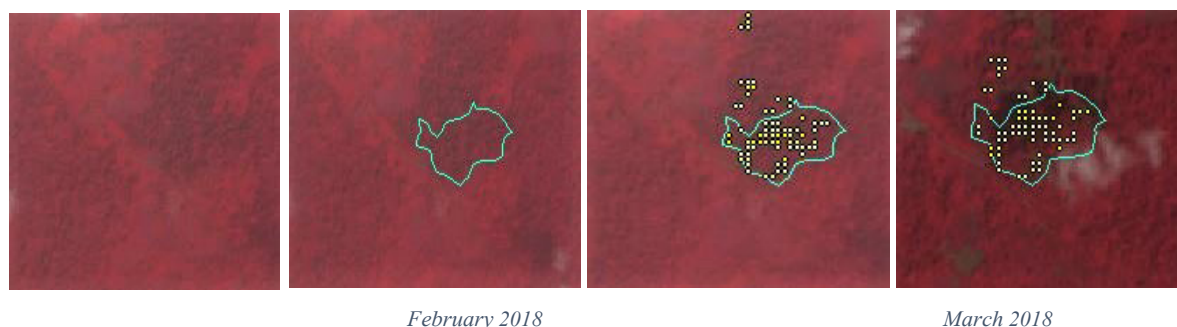


Figure 9. Alerts due to seasonal farming in the Littoral (Sentinel 2 images)

The Littoral region is famed for agricultural activities. As shown in table 4, it recorded a forest cover loss of 55.39 ha in the 1st quarter of 2018, of which 27.48 ha were due to seasonal

farming, 10.49 ha for agribusiness, notably palm and banana plantations, 11.42 ha in Council Forests, 4.79 ha in Community Forests and 1.20 in Sales of Standing Volumes.

Table 4. Area of cleared forest (ha) for each land use type per month in the Littoral Region

Land use type	January	February	March	Total	Quarterly %
Agribusinesses	0	10.11	0.39	10.49	18.94
Seasonal farming	0.49	0.96	26.03	27.48	49.61
Council Forests	0	0	11.42	11.42	20.62
Community Forests	0	0	4.79	4.79	8.65
Sales of Standing Volumes	0	0	1.20	1.20	2.17
Total	0.49	11.07	43.83	55.39	100

Agricultural activity was most intense in March for smallholder farmers and in January for agribusinesses as shown in Figure 9.

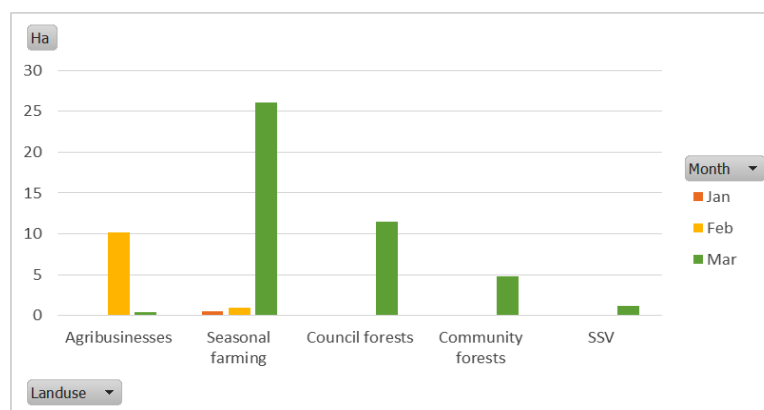


Figure 10. Area of cleared forest (ha) for each land use type per month in the Littoral Region

7.1.5. South West Region

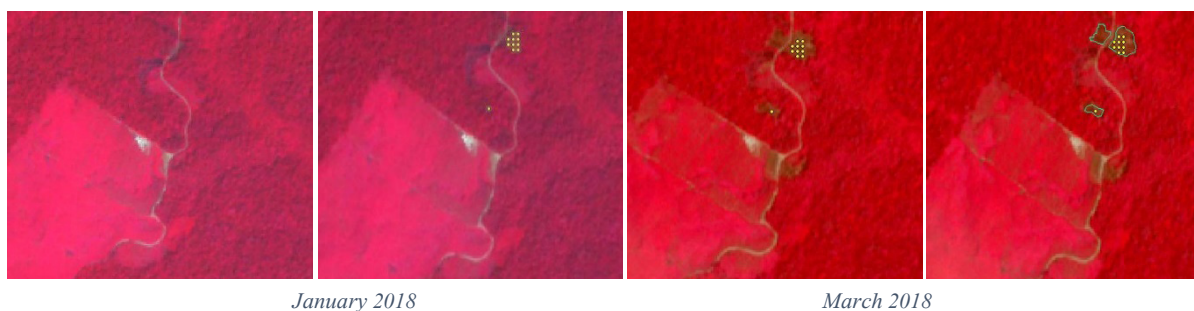


Figure 11. Alertes dues aux cultures annuelles dans la région du Sud-Ouest (Image Sentinel 2)

The South West region is another agriculture hotspot. Table 5 shows a cover loss of 91.59 ha in the 1st quarter of 2018, of which 74.15 % occurred in farming areas, 1.36 % in the vicinity of the Takamanda National Park and 1.79 % in the Mount Kupe Protection Forest.

Tableau 5. : Area of cleared forest (ha) for each land use type per month in the South West Region

Land use type	January	February	March	Total	Quarterly %
Others	0	0	1.89	1.89	2.06
Seasonal farming	0	8.66	59.25	67.91	74.15
Council Forests	0	0	1.12	1.12	1.22
Protection Forests	0	1.64	0	1.64	1.79
Vicinity of Protected Areas	0	1.25	0	1.25	1.36
FMU	0	17.79	0	17.79	19.42
Total	0	29.32	62.26	91.59	100

There was much agricultural activity in March and felling in FMUs in February as presented in figure 12 below.

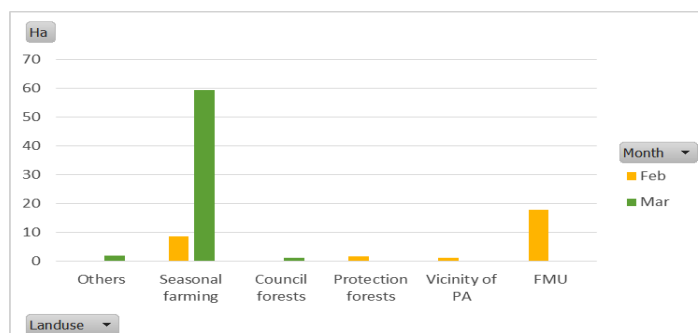


Figure 12. Area of cleared forest (ha) for each land use type per month in the South West Region

7.1.6. North West Region

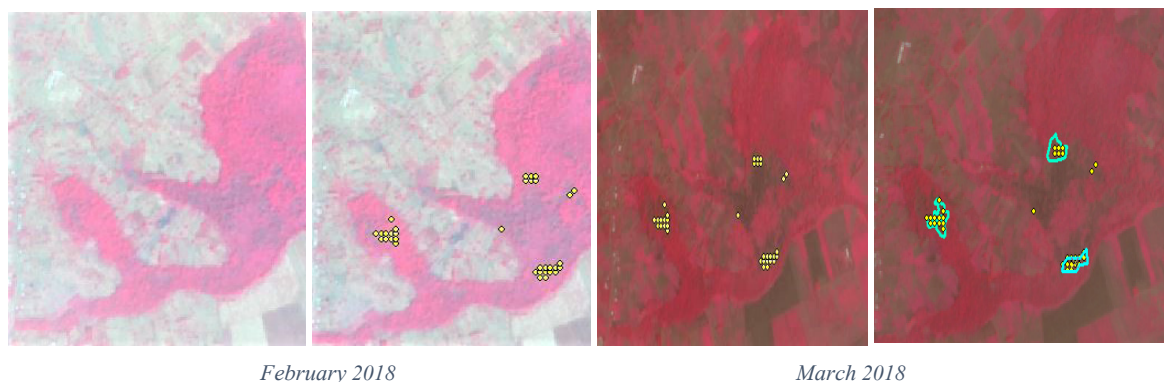


Figure 13. Alerts due to seasonal farming in the North West Region (Sentinel 2 Images)

Table 6 shows that in the 1st quarter of 2018, seasonal farming accounted for forest cover changes over a total area of 77.25 ha in the North West, more than 80% of which occurred in FMUs and the rest in farmlands.

Table 6. Area of cleared forest (ha) for each land use type per month in the North West Region

Land use type	January	February	March	Total	Quarterly %
Seasonal farming	0	13.81	48.15	61.96	80.21
FMUs	0	1.93	13.36	15.29	19.79
Total	0	15.74	61.51	77.25	100

Just like in other regions, the highest forest cover losses were recorded in March as shown in figure 14 below.

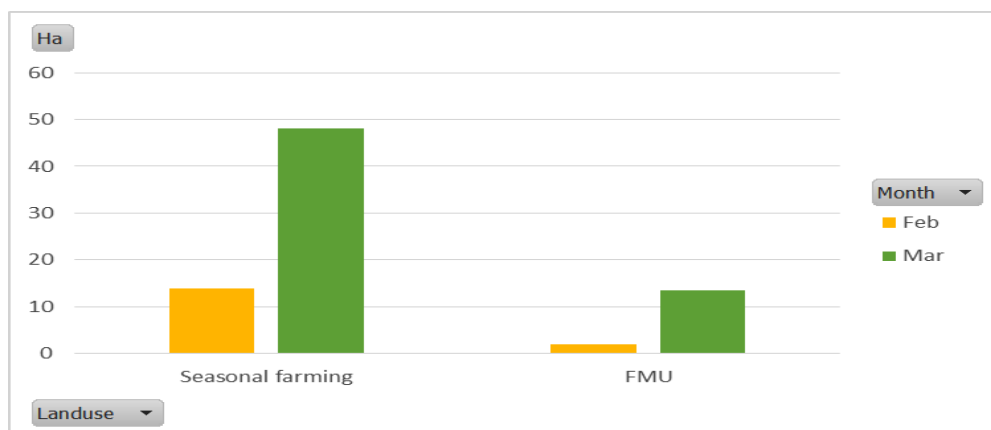


Figure 14. Area of cleared forest (ha) for each land use type per month in the North West Region

7.1.7. West Region

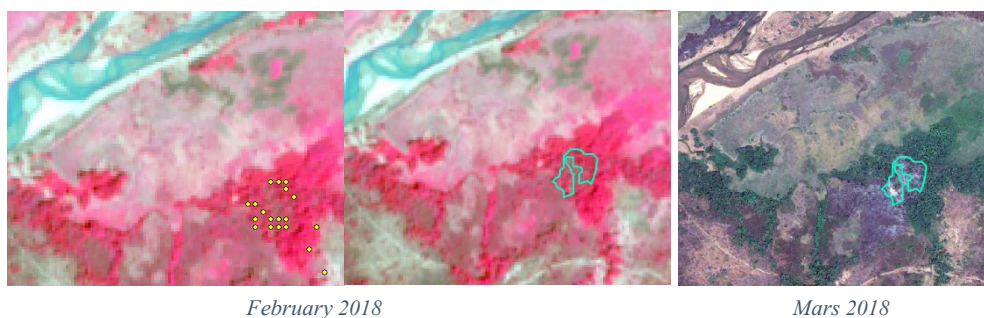


Figure 15. Alerts due to seasonal farming in the West Region (Sentinel 2 and Quickbird images)

In the West Region, 36.94 ha of forests were cleared in the 1st quarter of 2018. As shown in table 7, over 97 % of forest cover loss was driven by seasonal farming (35.85 ha), especially in February (figure 15). However, the drivers of a small proportion of tree cover loss (about 3%) could not be determined.

Table 7. Area of cleared forest (ha) for each land use type per month in the West Region

Land use type	January	February	March	Total	Quarterly %
Others	0	1.09	0	1.09	2.95
Seasonal farming	0	23.98	11.87	35.85	97.05
Total	0	25.07	11.87	36.94	100

Unlike observations made in other regions, the month of February recorded more than double the area of forests cleared in March (figure 16).

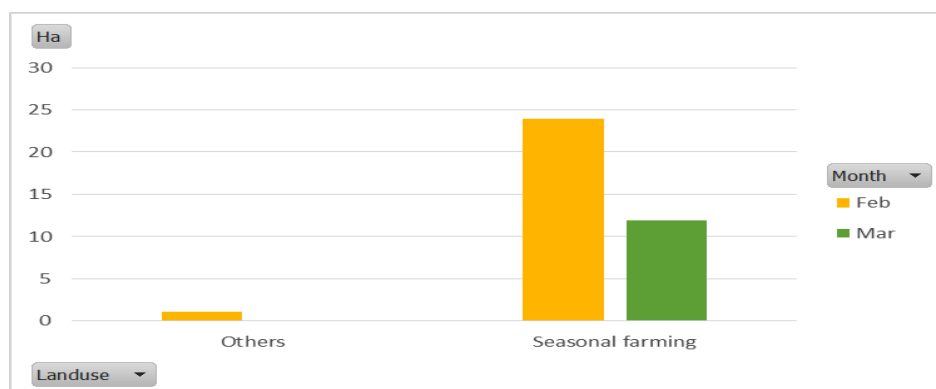


Figure 16. Area of cleared forest (ha) for each land use type per month in the West Region

7.1.8. Adamawa Region

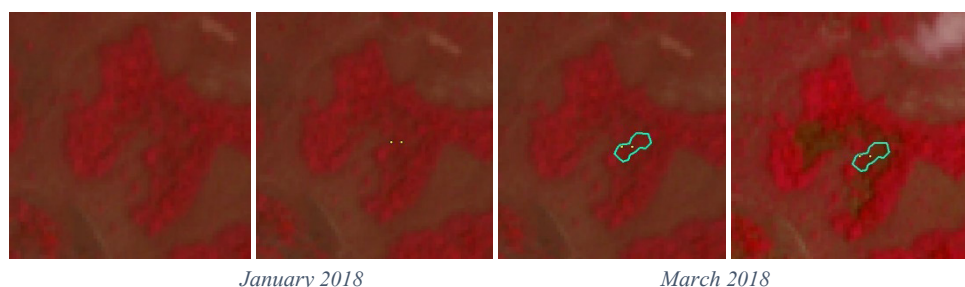


Figure 17. Alerts due to seasonal farming in the Adamawa Region (Sentinel 2 images)

About 87 % of loss recorded in the Adamawa in the 1st quarter of 2018 was due to the expansion of farmlands (table 8). 13% of loss drivers could not be determined.

Table 8. Area of cleared forest (ha) for each land use type per month in the Adamawa Region

Land use type	January	February	March	Total	Quarterly %
Others	2.78	29.97	3.87	36.62	13.13
Seasonal farming	28.86	90.32	123.18	242.37	86.87
Total	31.64	120.30	127.06	278.99	100

There was an exponential change in forest loss from January to March 2018 (figure 18). The month of March recorded the widest surface areas cleared.

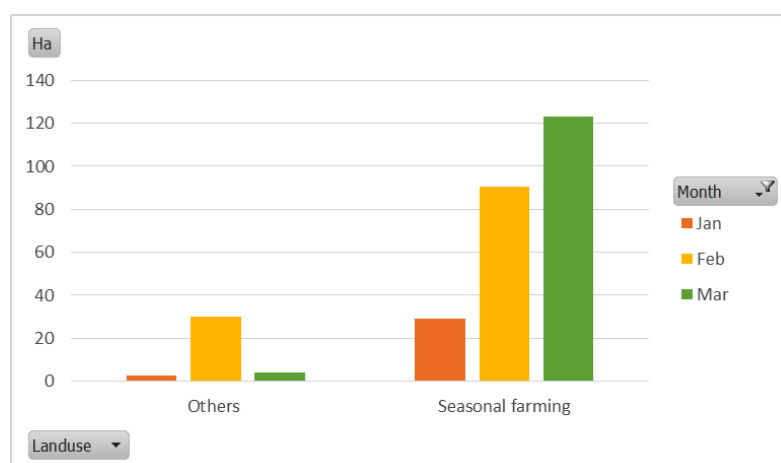


Figure 18. . Area of cleared forest (ha) for each land use type per month in the Adamawa Region

7.1.9. Far North and North Regions

Alerts identified in the Far North and North Regions were not considered because they instead indicated transitions from a non-forest to a non-forest state.

7.2. Summary of alert trends

Forest cover loss stood at 3,297.71 ha nationwide. 63.44 % of this occurred in the East Region; 13.80 % in the Centre; 8.46 % in the Adamawa; 6.38 % in the South; 2.78 % in the South West; 2.34 % in the North West; 1.68 % in the Littoral and 1.12% in the West (table 10). Just 11 % occurred in the permanent estate as against 89% in the non-permanent estate (table 9).

Table 9. Summary of cleared areas in hectares per estate type

	Far North	North	Adamawa	North West	West	South West	Littoral	South	Centre	East	Total
Permanent Forest Estate											363.04
FMU	0	0	0	15.29	0	17.79	0	20.17	39.98	37.58	130.81
Agribusinesses	0	0	0	0	0	0	10.49	48.8	22.44	0	81.73
Council Forests	0	0	0	0	0	1.12	11.42	0	2.6	115.53	130.67
Vicinity of PAs	0	0	0	0	0	1.25	0	0	3.84	0	5.09
Protection Forests	0	0	0	0	0	1.64	0	0	3.84	9.26	14.74
Non-permanent estate											2934.67
Mining	0	0	0	0	0	0	0	0.28	0	269.68	269.96
SSV	0	0	0	0	0	0	1.2	15.82	0.52	9.49	27.03
Community Forests	0	0	0	0	0	0	4.79	25.43	90.79	213.31	334.32
Seasonal farming	0	0	242.37	61.96	35.85	67.91	27.48	81.87	287.2	439.16	1243.8
Urbanisation	0	0	0	0	0	0	0	1.88	0.84	0	2.72
Infrastructure	0	0	0	0	0	0	0	1.37	2.87	938.82	943.06
Logging in non-certified timber concessions	0	0	0	0	0	0	0	12.2	0	59.33	71.53
Others	0	0	36.62	0	1.09	1.89	0	2.65	0	0	42.25
Total	0	0	278.99	77.25	36.94	91.6	55.38	210.47	454.92	2092.16	3297.71

Table 10. Land use change trends in hectares for each driver per region

Driver \ Region	Agribusinesses	Protection Forests	Mining	FMU	Council Forests	SSV	Community Forests	Seasonal farming	Vicinity of PAs	Urbanisation	Infrastructure	Logging in non-certified timber concessions	Others	Total
Far North	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adamawa	0	0	0	0	0	0	0	242.37	0	0	0	0	36.62	278.99
North West	0	0	0	15.29	0	0	0	61.96	0	0	0	0	0	77.25
West	0	0	0	0	0	0	0	35.85	0	0	0	0	1.09	36.94
South West	0	1.64	0	17.79	1.12	0	0	67.91	1.25	0	0	0	1.89	91.59
Littoral	10.49	0	0	0.00	11.42	1.20	4.79	27.48	0.00	0	0	0	0	55.39
South	48.80	0	0.28	20.17	0.00	15.82	25.43	81.87	0.00	1.88	1.37	12.2	2.65	210.46
Centre	22.44	3.84	0	39.98	2.60	0.52	90.79	287.20	3.84	0.84	2.87	0	0	454.92
East	0.00	9.26	269.68	37.58	115.53	9.49	213.31	439.16	0.00	0.00	938.82	59.33	0.00	2092.16
Total	82	15	270	131	131	27	334	1315.33	5.09	3	943	71.53	42.25	3297.71

7.3. Major change drivers

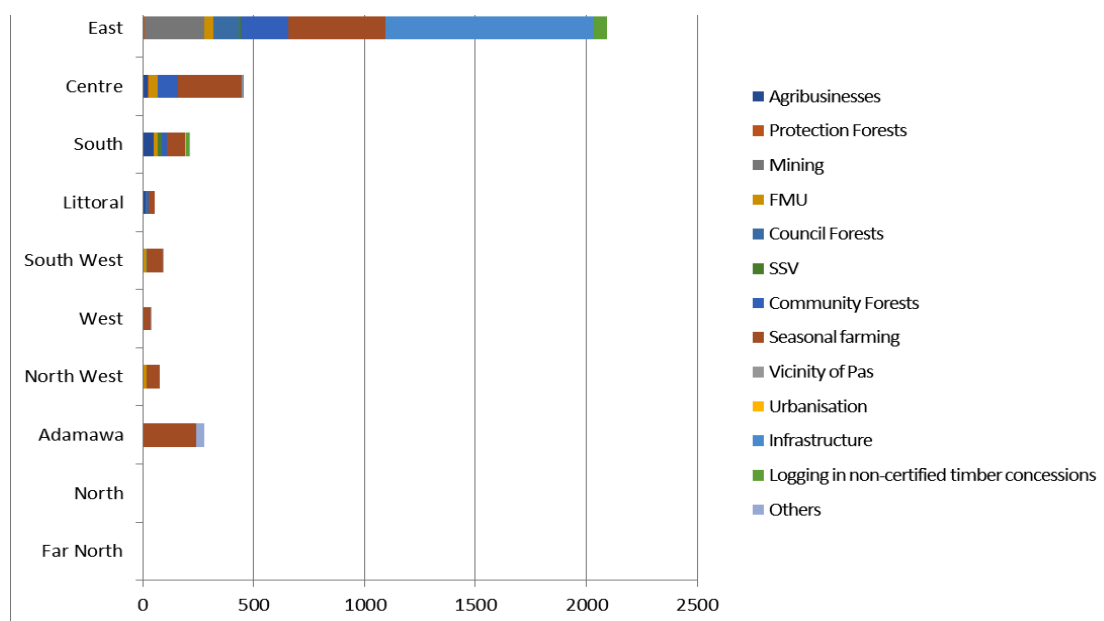


Figure 19. Major change drivers per region

The main identified change drivers (figure 9) include: infrastructure, logging, seasonal farming and mining in the East; seasonal farming and logging in the Centre; agribusiness in the South; agribusiness, seasonal farming and logging in the Littoral and South West; seasonal farming in the West; seasonal farming in the North West and the Adamawa.

In the 1st quarter of 2018, forest cover changes (figure 20) were driven at national level in descending order by: seasonal farming (38%),

infrastructure (29%), community forests (10%), mining (8%), FMUs (4%), council forests (4%), agribusiness (3%), logging in non-certified timber concessions (2%), sales of standing volumes (1%), and others (1%). Agriculture alone is responsible for 41 % of forest cover loss. In effect, the first quarter coincides with the dry season when farms are prepared for planting in March. Clearing and felling are done in January, while burns are done in February for small scale farming.

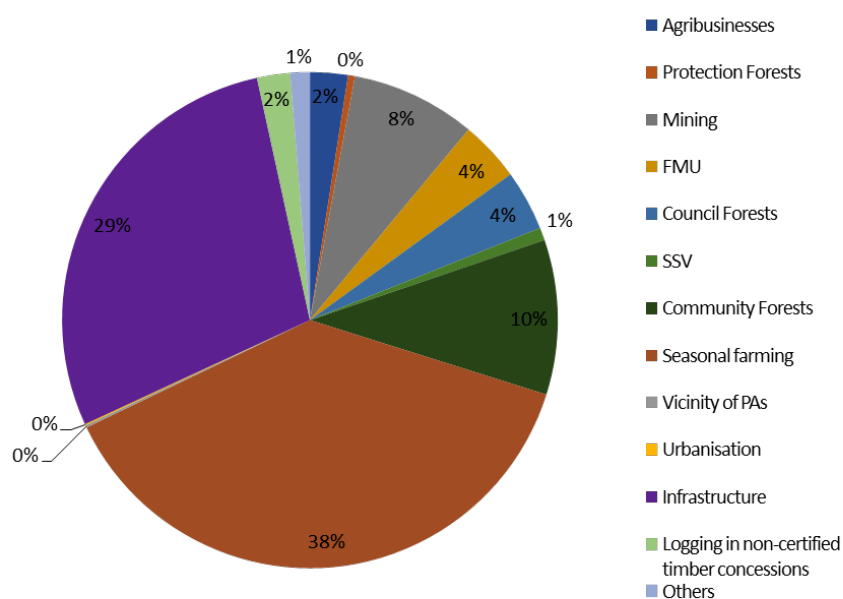


Figure 20. Major change drivers at national level (1st quarter 2018)

8. Conclusion and prospects

It follows from the analysis of the GLAD alerts that in the first quarter of 2018, 95% of alerts were observed in the non-permanent estate as against 5% in the permanent estate. 3.75 % of these were due to logging in non-certified timber concessions as against 5 % in certified timber concessions and less than 1 % in buffer zones in the vicinity of Protected Areas. Agriculture (agribusiness and seasonal farming) is the main driver of forest cover loss at national level. However, field missions for confirmation would help make more accurate findings.

GLAD alerts are thus a tool that could facilitate forestry control by reporting alerts in non-certified timber concessions for easier monitoring on the field by MINFOF, help identify degraded forest ecosystems as part of the African Forest Landscapes Restoration (AFR 100) initiative, as well as generate activity data on (land use change) under REDD+.

This work will be pursued for the other three quarters of 2018.

QUARTERLY NEWSLETTER FOR FOREST COVER MONITORING WITH GLAD ALERTS

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