Geospatial data integration for monitoring mining and the impact on the environment in Guyana

Ministry of Natural Resources, Guyana

March, 2023

Overview

G U Y A N A

Guyana's landscape features tropical forests, mountain ranges, savannahs, wetlands, and incredible waterways

Guyana is located on the Northern Coast of South America, sharing borders with Brazil, Suriname, and Venezuela.

Mining is a main economic activity in Guyana, however, Guyana's economy is extremely diverse including oil and gas production, agriculture, logging, manufacturing, tourism, etc.

GUYANA

85% of Guyana's land territory (215, 000 km²) is forested

Guyana has maintained the second-highest percentage of forest cover on earth

with more than **99**% of the country's forests remaining

Guyana's deforestation rates are among the lowest in the world (considered a

High Forest Low Deforestation (HFLD) state. Guyana's deforestation rate has

remained below **1**% since 2012

Mining in Guyana

- Guyana has a long history and tradition of mining at the small, medium, and large scales

- Gold mining, particularly, has been a major GDP contributor to Guyana's economy (8.3% of the non-oil GDP in 2022)

- Despite mining extraction over the years, Guyana has maintained low levels of deforestation

- Mining in Guyana is regulated by the Guyana Geology and mines commission (GGMC)

- The GGMC records data on the concession boundaries and the locations of mineral dredges

- Regular inspections are also undertaken and this information is then spatially linked to the dredges and the concession boundaries datasets

- The use of geospatial data plays a key role in measuring the extent and impact of mining in Guyana

- Geospatial data also plays a key role in monitoring mining activities in Guyana by combining datasets from a number of sources

- Data generated from Guyana's MRVS are used to measure deforestation and degradation from mining in Guyana
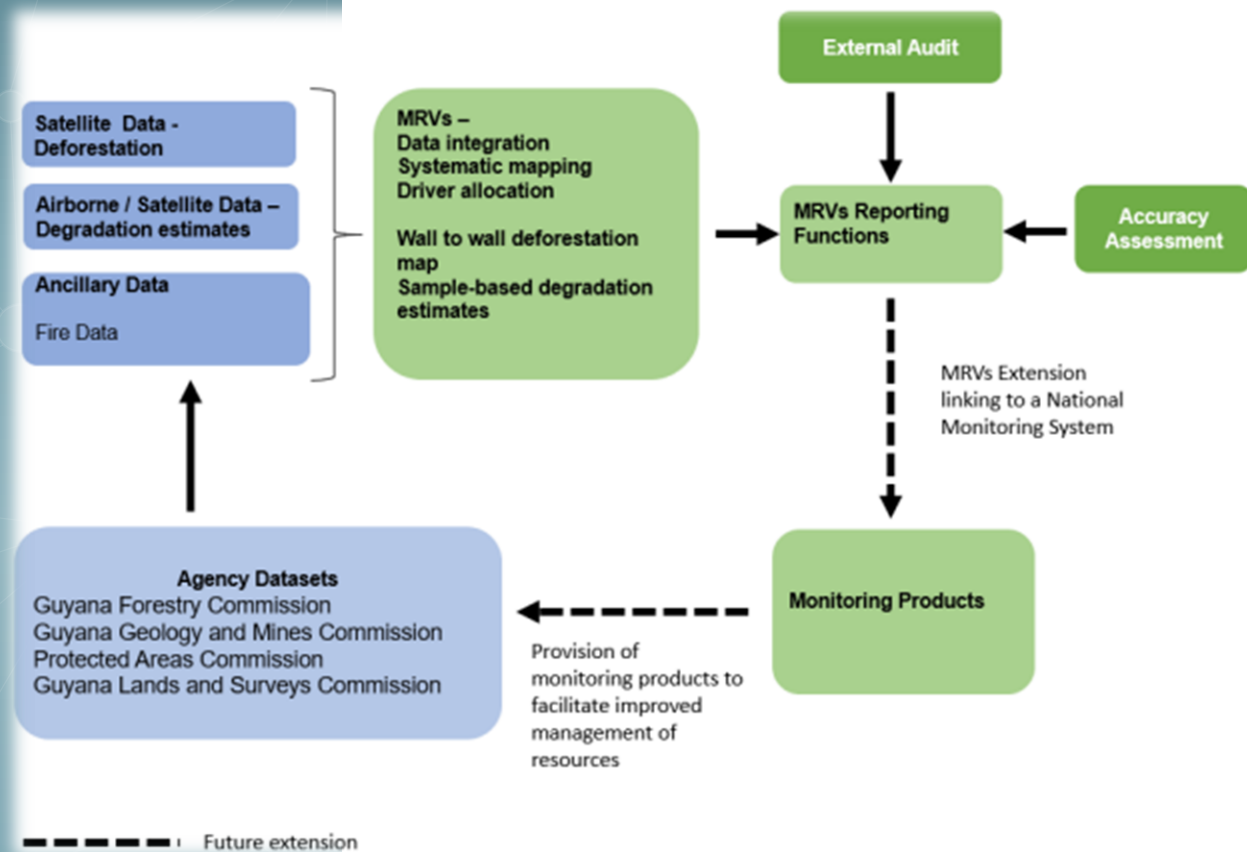
Guyana's MRVS

Guyana's Monitoring Reporting and Verification System (MRVS) is a national system developed to monitor, report and verify forest carbon emissions resulting from deforestation and degradation

In 2009, Guyana developed a framework for the MRVS and deforestation and degradation mapping commenced in 2010
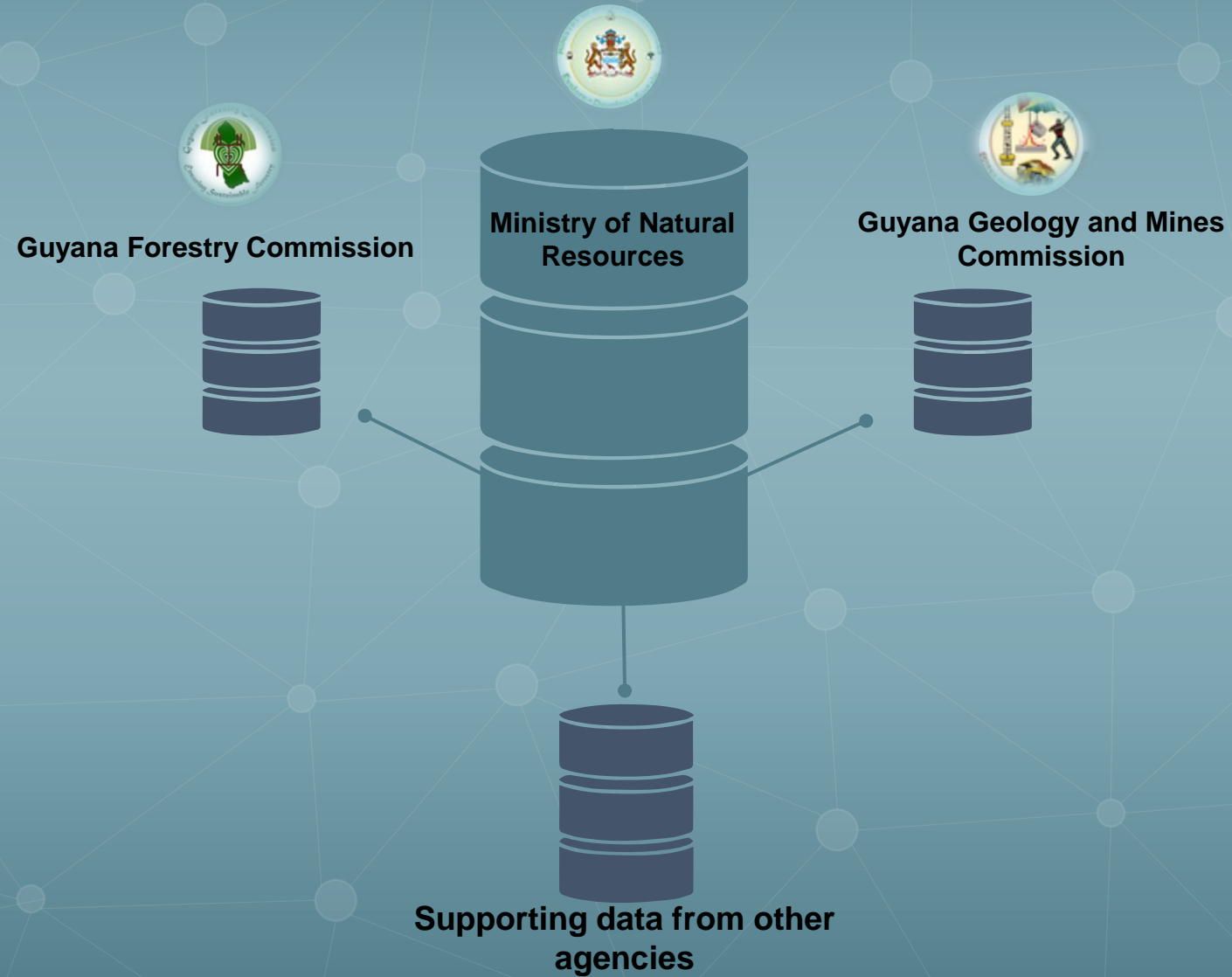
Through this robust system, Guyana has been able to track and quantify forest change and identify the associated drivers of this change for over a decade

The data generated from this national MRVS, is used across a number of sectors in Guyana to guide decision-making, natural resource, and environmental monitoring and policies

Geospatial data integration

Guyana Forestry Commission

Ministry of Natural Resources

Guyana Geology and Mines Commission

Supporting data from other agencies
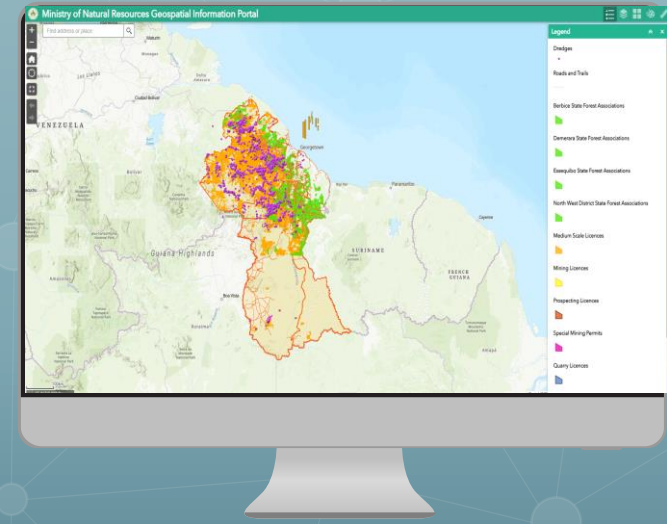
Integrating web-based solutions

The Ministry of Natural Resources and the Guyana Geology and Mines Commission have been able to optimize geospatial data by integrating web-based solutions to improve the monitoring of mining activities.

Dashboards

Dashboards configured using ArcGIS Online tools allow easy visualizations of statistical reports of mining operations

Web map applications

Web-map applications configured using ArcGIS Online tools allow visualization of multiple data layers to guide decision making

The use of web-based solutions via ArcGIS Online is a result of partnerships with USGS and a company called Cadasta.

Web map application

01 The application is accessible via the internet and requires log-in credentials that are available to key decision-makers and staff.

02 The application integrates datasets from a number of sources in one place that provides a comprehensive and spatial view of the activities in the natural resources sector
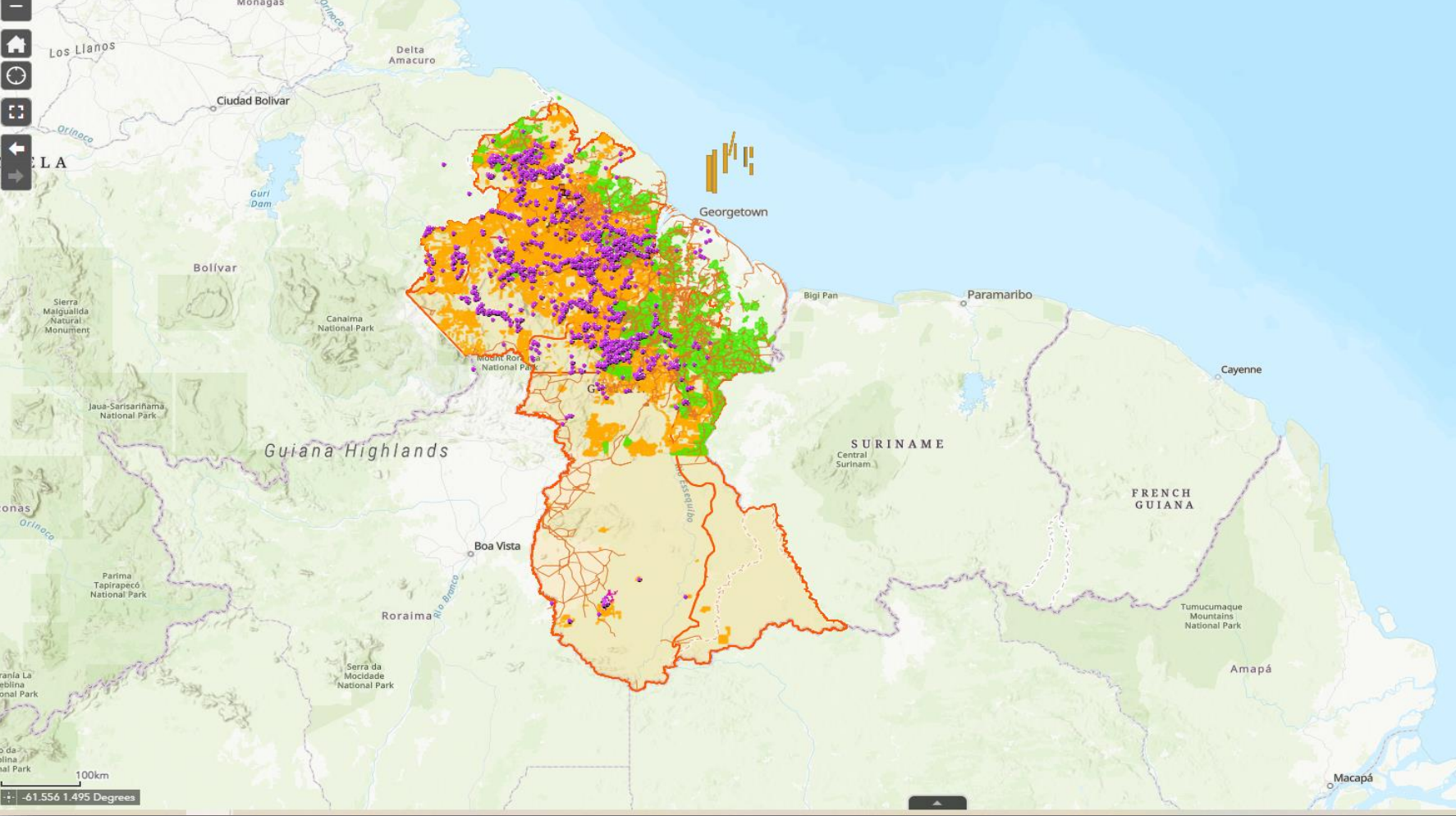
03 The application is interactive and allows further investigation of the datasets inclusive of viewing statistical attributes.

04 The datasets in the application are updated whenever there are updates from the agencies generating the data

Ministry of Natural Resources Geospatial Information Portal

Find address or place

Legend

Dredges
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Roads and Trails

Berbice State Forest Associations

Demerara State Forest Associations

Essequibo State Forest Associations

North West District State Forest Associations

Medium Scale Licences

Mining Licences

Prospecting Licences

Special Mining Permits

Quarry Licences

Find address or place
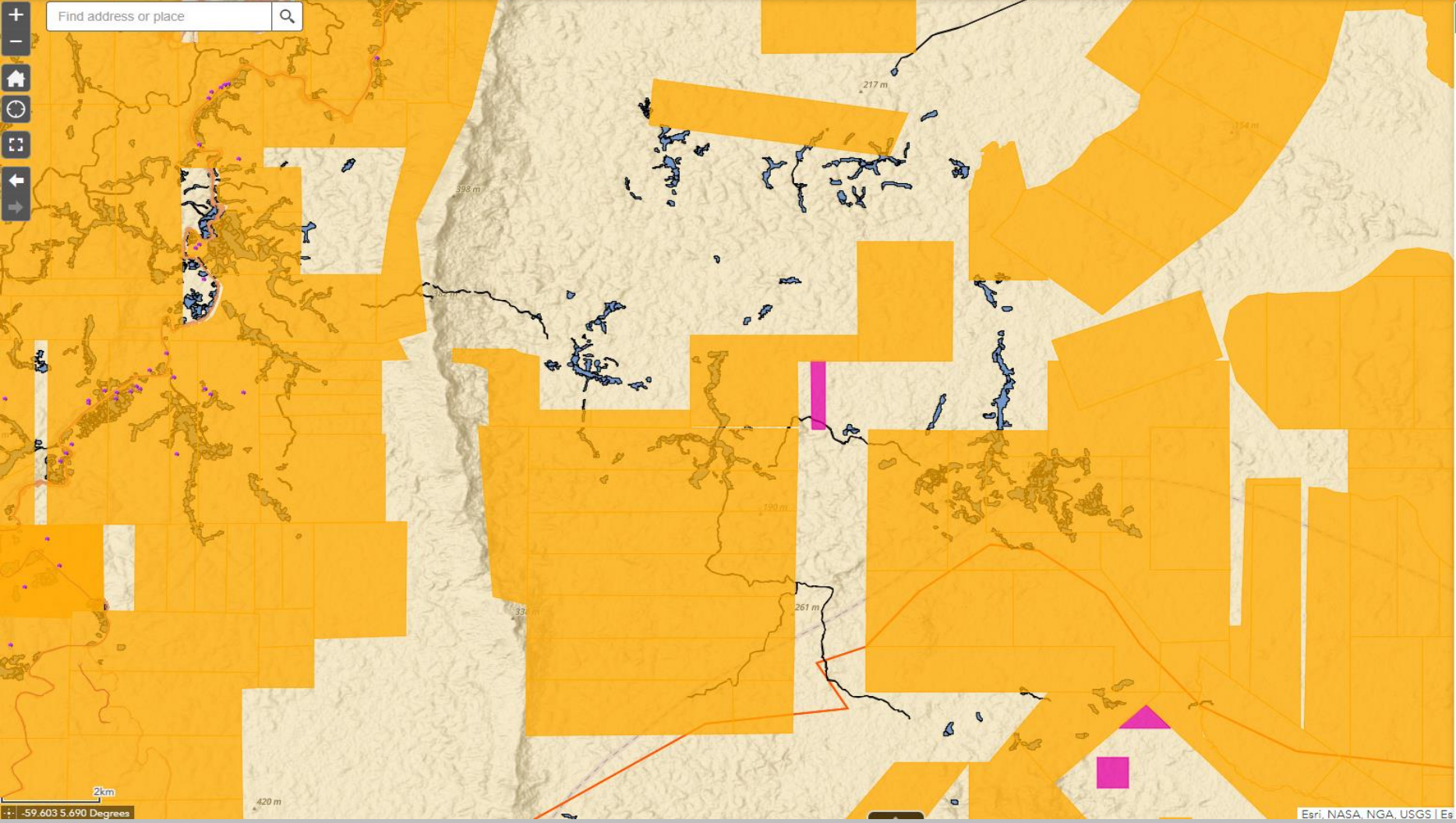
Legend

Medium Scale Licences

Mining Licences

Prospecting Licences

Special Mining Permits

Quarry Licences

GFC_Reserves

Non forest 2021

All Change 2021

Mining Districts

World_Hillshade
World Hillshade

2km

-59.603 5.690 Degrees

217 m

154 m

398 m

302 m

190 m

330 m

261 m

420 m

Esri, NASA, NGA, USGS | Es

Kaieteur National Park Monitoring

Dredges

Forest Area Change 2021

Y12Driver

Mining

Fire

Reforestation

Forestry Roads

KNP

World_Hillshade

World Hillshade

Find address or place

-59.628 5.021 Degrees

Esri, NASA, NGA, USGS | Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

POWERED BY esri
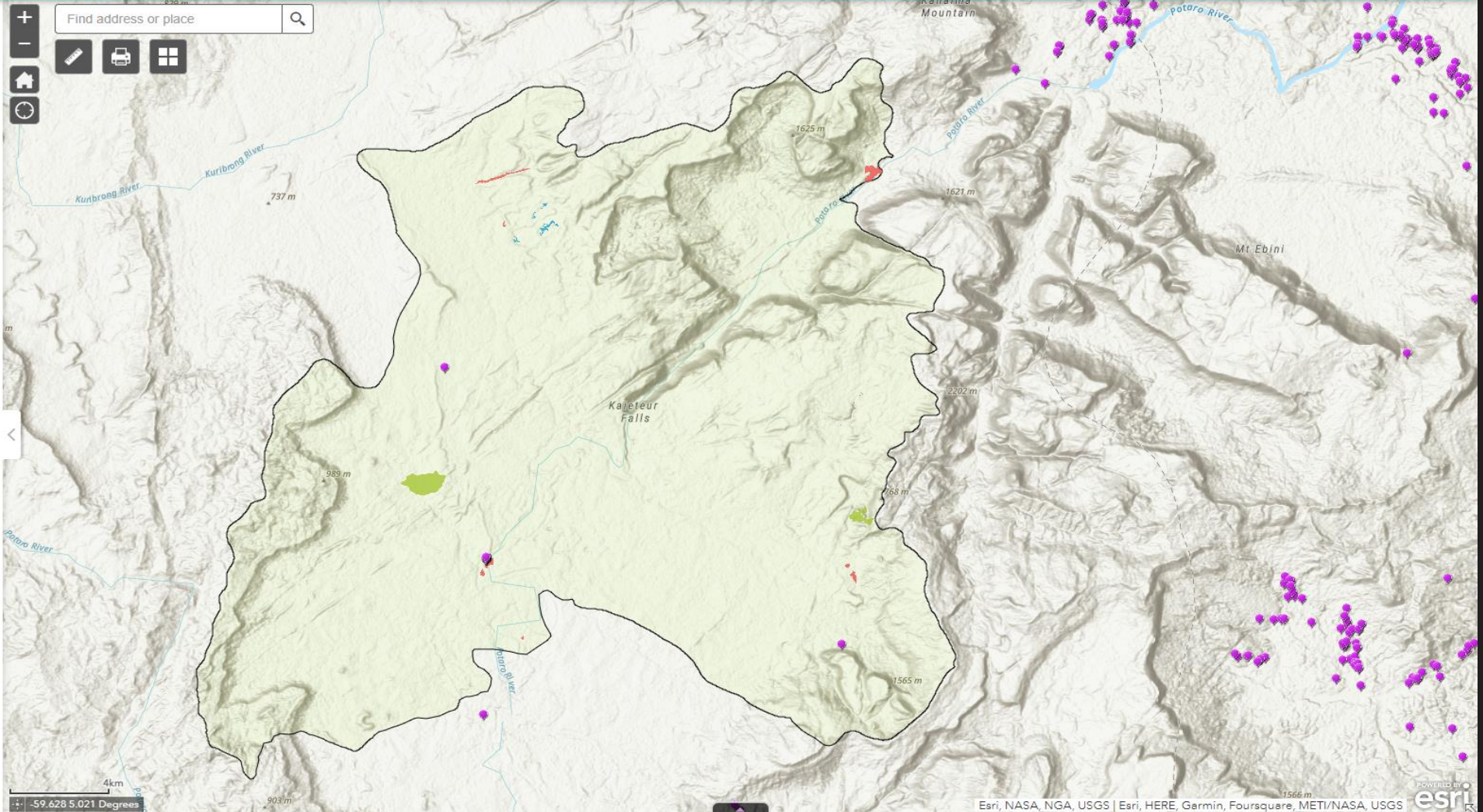
Dashboards

01 Dashboards are also accessible via the internet and require log-in credentials

02 The dashboards provide a visualization of multiple screens at once that work together to provide valuable information to the user
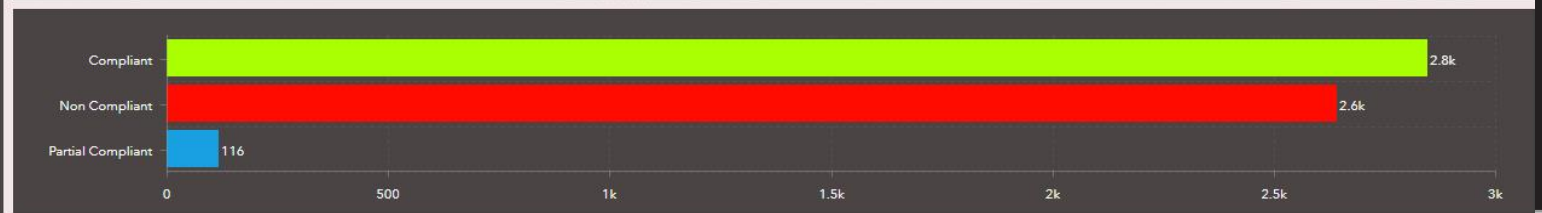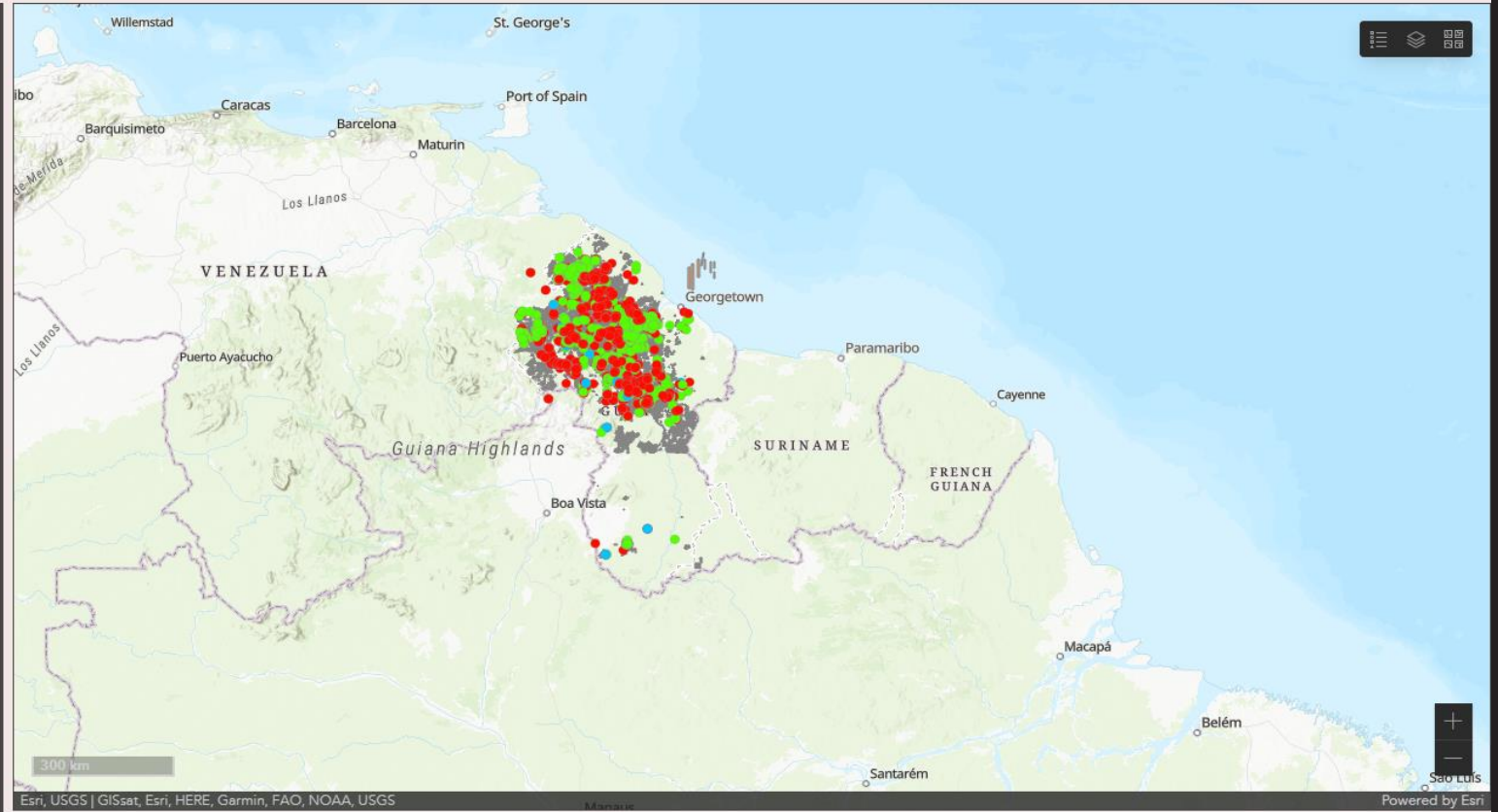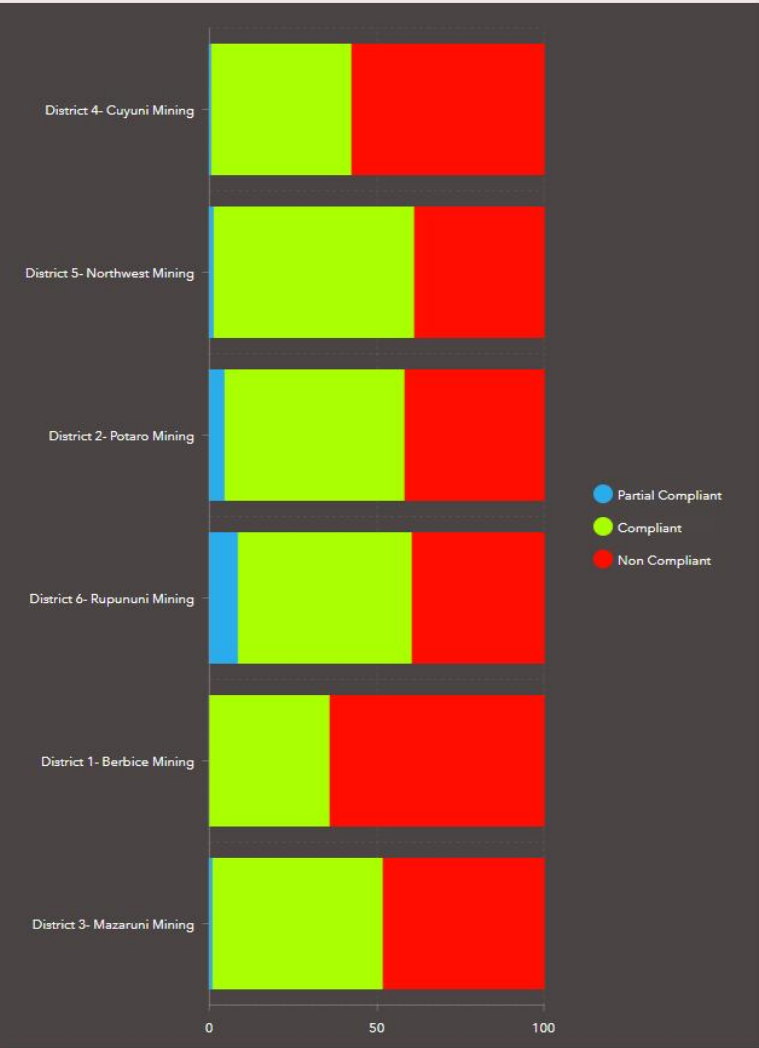
03 The visualizations are based on the quality of the datasets and the type of information that is available in a spatial format

04 Like the web map applications, the dashboards are updated whenever there are updates from the agencies generating the data

Dredges Dashboard

District 4- Cuyuni Mining

District 5- Northwest Mining

District 2- Potaro Mining

District 6- Rupununi Mining

District 1- Berbice Mining

District 3- Mazaruni Mining

- **Partial Compliant**
- **Compliant**
- **Non Compliant**

0   50   100

Willemstad   St. George's

Caracas   Port of Spain
Barquisimeto   Barcelona
    Maturin

VENEZUELA   Georgetown
Los Llanos   Paramaribo

Puerto Ayacucho   Cayenne
Los Llanos   GU   SURINAME   FRENCH
    GUIANA

Guiana Highlands

Boa Vista
    Macapá

    Belém

300 km   Santarém

Esri, USGS | GISsat, Esri, HERE, Garmin, FAO, NOAA, USGS   Manaus   São Luís
    Powered by Esri

Compliant   2.8k
Non Compliant   2.6k
Partial Compliant   116

0   500   1k   1.5k   2k   2.5k   3k

Data-driven policies- Guyana's LCDS 2030

Building on the work started in 2009, Guyana launched its expanded Low Carbon Development Strategy 2030 - a framework to map the path of a new growth trajectory in a non-polluting way

The national strategy outlines a number of policy directions to ensure continued extractive activities while protecting the environment. This includes measures to maintain low deforestation, improve mining practices, and gain payments for forest conservation

These measures outlined in the LCDS 2030 are driven by data generated by the robust national MRVS
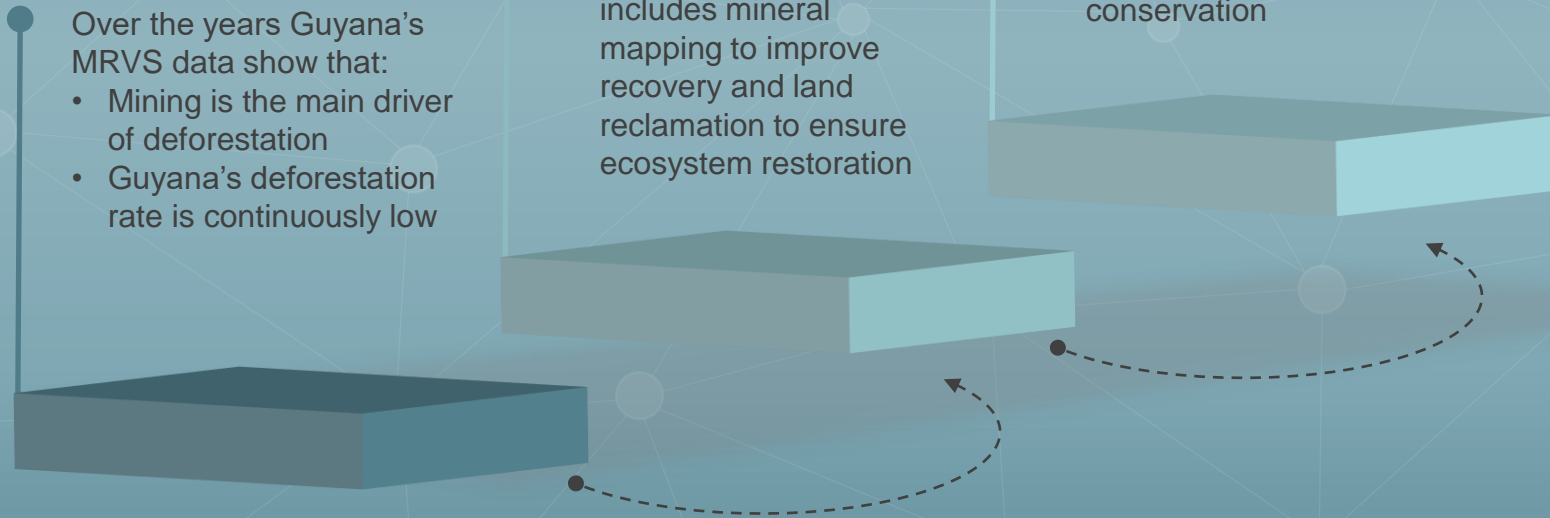
Data-driven policies- Guyana's LCDS 2030

Over the years Guyana's MRVS data show that:
- Mining is the main driver of deforestation
- Guyana's deforestation rate is continuously low

- This data is used to inform policies to ensure low-impact mining. This includes mineral mapping to improve recovery and land reclamation to ensure ecosystem restoration

- Further, with consistently low deforestation rates and the data to support this, Guyana has leveraged its HFLD status to gain payments for forest conservation