THE IMPACTS OF COVID-19 ON DEFORESTATION IN COLOMBIA

Mehran Khodadadi[1,2], Jonnathan Cespedes[4], Katharina Löhr[2,3], Augusto Castro-Nunez[4], Stefan Sieber[1,2]
[1]Humboldt Universität zu Berlin, Department of Agricultural Economics
[2]Leibniz Centre for Agricultural Landscape Research, Sustainable Land Use in Developing Countries (SusLAND)
[3]Humboldt-Universität zu Berlin, Urban Plant Ecophysiology, Berlin, Germany
[4]International Center for Tropical Agriculture (CIAT), Cali, Colombia

1. Introduction

Poster Objectives: (i) to analyze how the current coronavirus pandemic involves deforestation in order to determine if the pandemic adds further complexity to forest conservation and (ii) how the absence or lack of monitoring and controlling parties could encourage the rural people and regional mafias to illegal activities, which causes increasing deforestation rates over the country during the pandemic.

- **More impacts on forests:** During the pandemic period, increasing illegal activities could cause higher pressure on forests (by converting forests to agricultural lands and illegal timber harvesting).

- **Deforestation on the worldwide scale:** About 645 thousand ha lost in March 2020, where Indonesia led by 130 thousand ha, almost three times more than March 2019 (WWF 2020). The Democratic Republic of Congo was in second place (almost 100 thousand ha), followed by Brazil with 95 thousand ha. In Brazil, from January to April, deforestation alerts over indigenous regions increased by 59% compared to the same period in 2019 (Greenpeace, 2020).

- **Higher deforestation over the country:** In Colombia, contrary to other countries in the Amazon region, the trend in 2019 showed a reduction in deforestation compared to 2018. However, 2020 started with an increasing tendency, and the quarantine seems to have worsened the situation (FCDS, April 2020). According to (WWF 2020), Colombia is among the countries that faced an increase in deforestation in March 2020 compared to March 2019.

- According to the Amazon Institute for Scientific Research (SINCHI) around **13,000 hot points** were recorded in the Amazon region (with the presence of the Revolutionary Armed Forces of Colombia (FARC)) in March. This number is almost 275 percent higher than the same month in 2019.
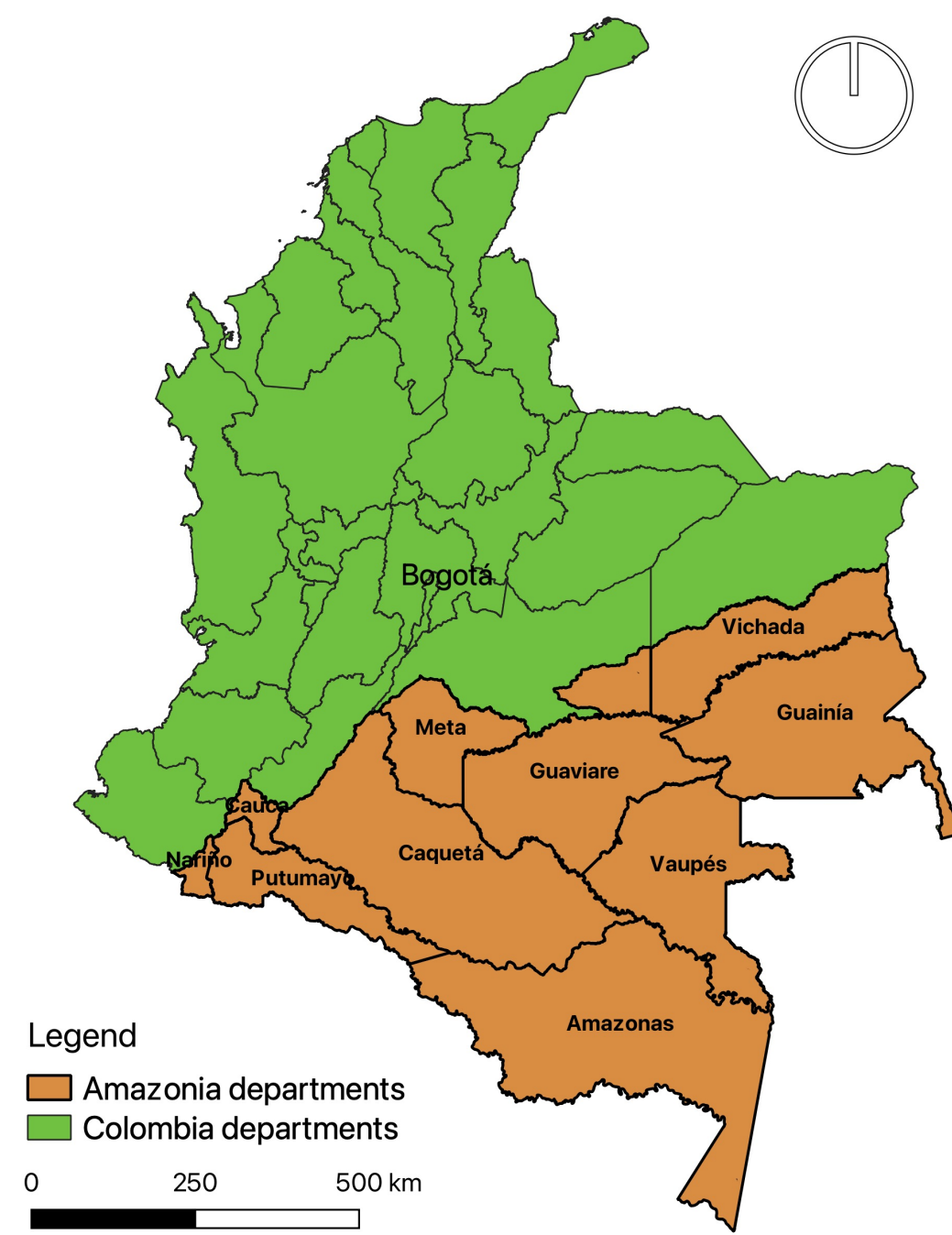
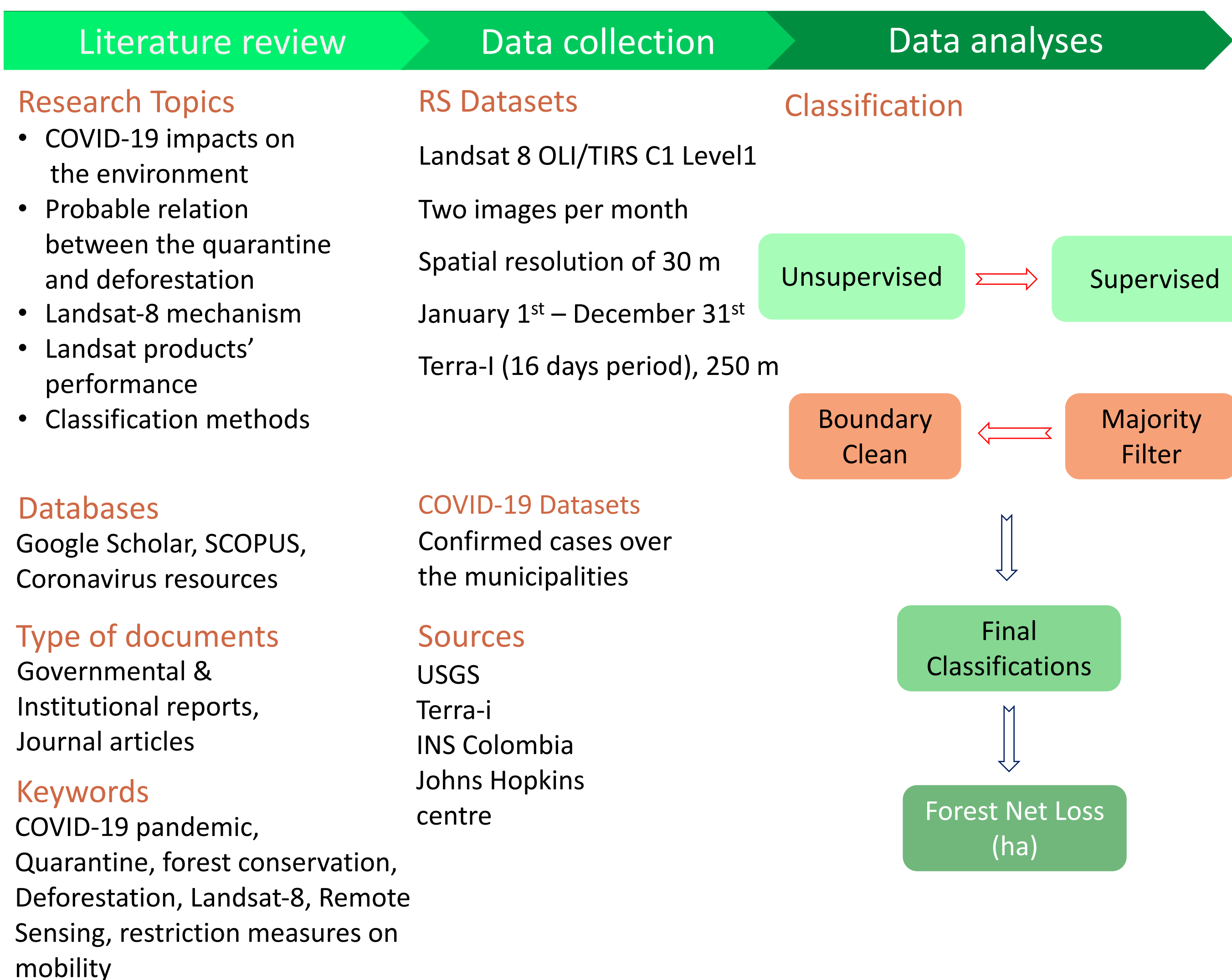Figure 1. Deforestation in Colombia, (REDD, 2020)

2. Research Question

What are the impacts of COVID-19 on deforestation in the Amazon region of Colombia?

(Does COVID-19 enhance deforestation in Colombia?)

3. Case Study

- Total area of the Amazonia region is about 483,000 km² equal to almost 42 percent of entire Colombia.
- Around 404 thousand km² natural forests are determined in the Amazonia (Murcia , et al., 2014).
- The department of Caquetá lost 5.2 percent of its area (abc (Murad & Pearse, 2018).
- Amazonia region covers aquatic birds, amphibians, plants, fishes, and forests over departments of Amazonas, Caquetá, Guainía, Guaviare, Putumayo, Vaupés, and Vichada (González , et al., 2015).
- This region is home to Flora and wildlife of Colombia, and national natural parks such as Amacayacu, Puinawai, La Paya, Chiribiquete, and Churumbelos are located in the Amazonia (FAO, 2020).
- **Protection programs developed by the government in a corporation with international players:**
- Amazon vision (Visión Amazonía) started in 2016 (GGGI, 2016) (FAO, 2020). The main goal of this project is to reduce (zero) deforestation in the Colombian Amazon by enhancing local communities and indigenous people. They plan is to generate alternatives with low negative impacts on forests to reduce remarkable amounts of CO_2 emissions. Forest governance, sustainable agriculture practices, and land-use planning are some other goals of this vision.
- Heart of the amazon (Corazón de la Amazonía) (The World Bank, 2014) is another protection program launched by the Colombian government and the Global Environment Facility (GEF) to support forest governance and improve sustainable land uses. This program covers an area with 3500 of indigenous people mainly over the departments of Caquetá and Guaviare (FAO, 2020).

Legend
- Amazonia departments
- Colombia departments

0   250   500 km

4. Methodology

Literature review	Data collection	Data analyses

Research Topics
- COVID-19 impacts on the environment
- Probable relation between the quarantine and deforestation
- Landsat-8 mechanism
- Landsat products' performance
- Classification methods

Databases
Google Scholar, SCOPUS, Coronavirus resources

Type of documents
Governmental & Institutional reports, Journal articles

Keywords
COVID-19 pandemic, Quarantine, forest conservation, Deforestation, Landsat-8, Remote Sensing, restriction measures on mobility

RS Datasets
Landsat 8 OLI/TIRS C1 Level1

Two images per month

Spatial resolution of 30 m

January 1st – December 31st

Terra-I (16 days period), 250 m

COVID-19 Datasets
Confirmed cases over the municipalities

Sources
USGS
Terra-i
INS Colombia
Johns Hopkins centre

Classification

Unsupervised ⇒ Supervised

Boundary Clean ⇒ Majority Filter

Final Classifications

Forest Net Loss (ha)

5. Results

Figure 2. (left) Total vegetation and forest loss over the Amazon region of Colombia in 2020 and (right) total vegetation and forest loss during the periods of 16-days.
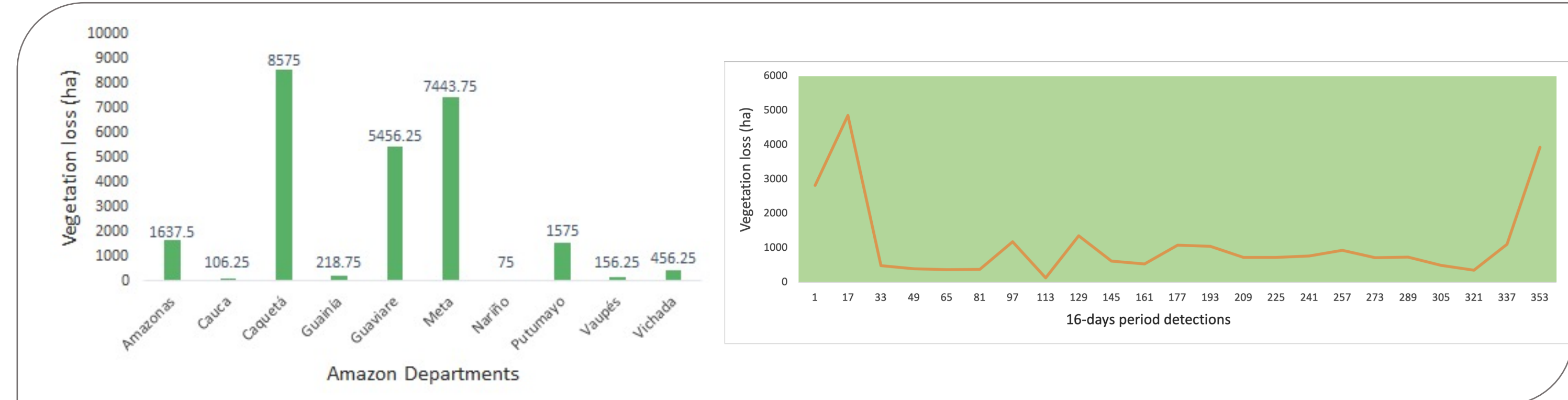

Figure 3. (left) Total vegetation and forest loss over the Amazon region of Colombia in 2019 and (right) total vegetation and forest loss during the periods of 16-days.
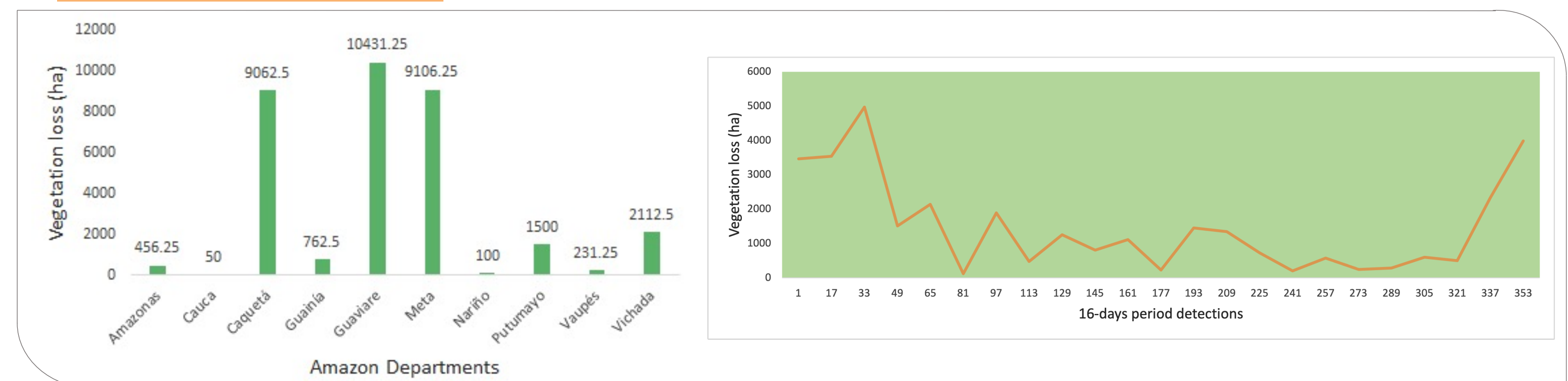

Figure 4. (left) Landsat 8 classification results of forest loss over the Amazon region of Colombia in 2020 and (right) departments with highest and lowest deforestation rates.
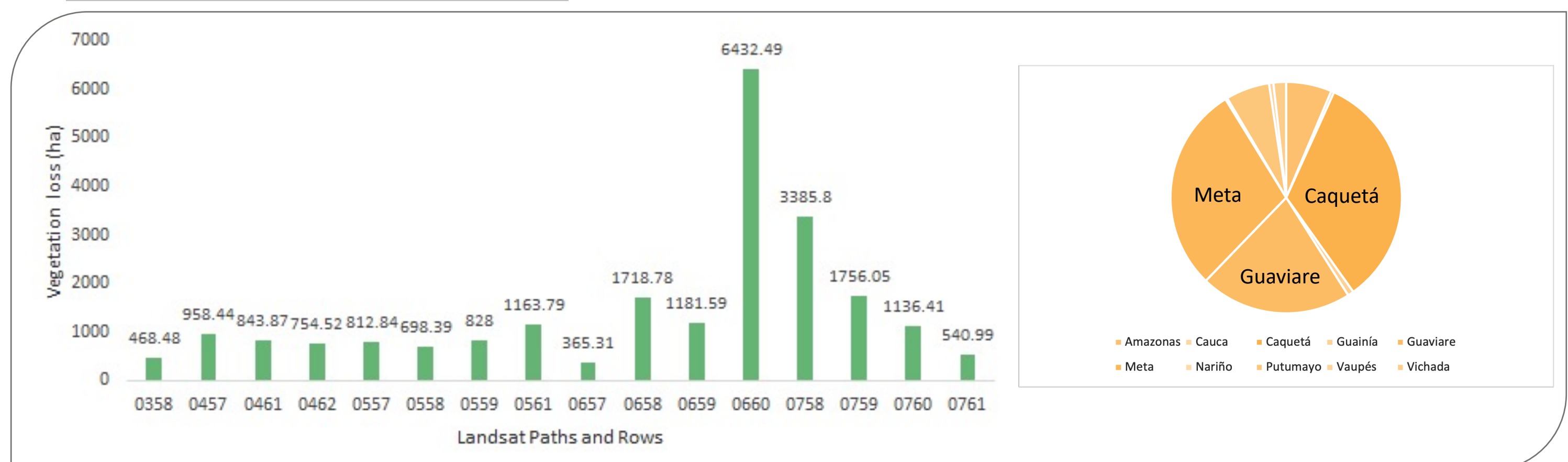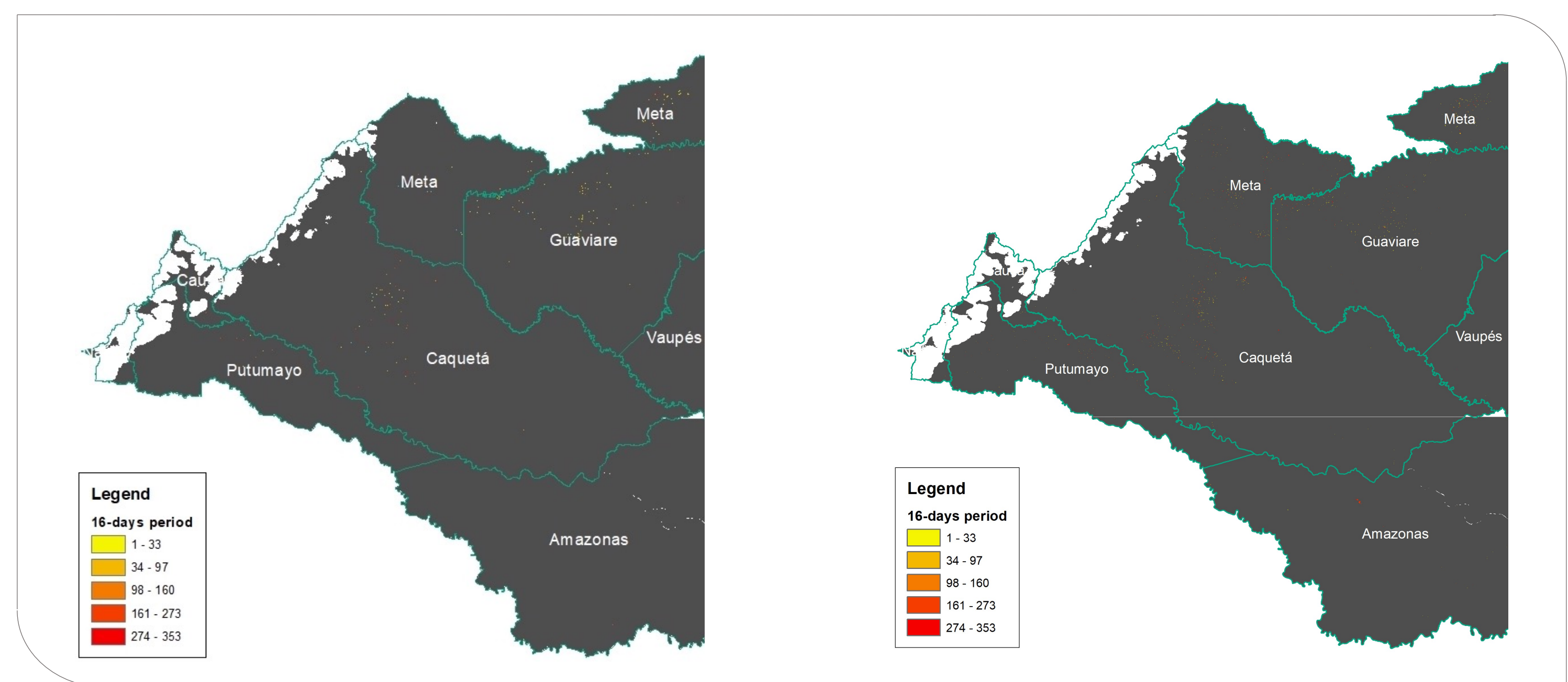

Figure 5. Maps showing departments with highest rates of deforestation in 2019 (left) and 2020 (right).

6. Conclusions and Recommendations

➢ Results derived from Terra-i datasets showed a reduction in vegetation and forest loss over the region in 2020. In this year, the Amazon region of Colombia lost 25,700 ha, almost 8 thousand ha less than 2019.
➢ Terra-i and Landsat 8 datasets revealed that Caquetá, Meta, and Guaviare departments had the highest rates of deforestation.
➢ Mobility restrictions and quarantine reduced forest loss in general. However, deforestation over the region is still going on.
➢ During the pandemic with lower monitoring and controlling regulations, departments with high populations had faced higher deforestation rates. Amazonas department experienced rates three-time more than previous years.

- Reduction in deforestation rates (in 2020), can display a positive point about public awareness and social cohesion facing a mutual challenge. However, long-term impacts of COVID-19 on forest conservation programs and deforestation, need further studies in the future.
- To better management of protection programs, it is necessary to discover the main impactors on the forest during the pandemic (e.g., FARC).

7. Limitations

- Analysing Landsat images could be complicated due to the high cloud cover over the study area. This study only analyzed sixteen Landsat 8 images over the Amazon region. However, more than fifty raster images published by the USGS department, but most of them have high cloud cover.

- Due to low Spatio-temporal available Landsat products over the country, this study only focused on Amazon Region and year 2020 when COIVID-19 recognized pandemic.

8. References

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Contact:
mehran.khodadadi@zalf.de,   katharina.loehr@zalf.de
jonnathan.cespedes@gmail.com,   Stefan.Sieber@zalf.de
Augusto.Castro@cgiar.org