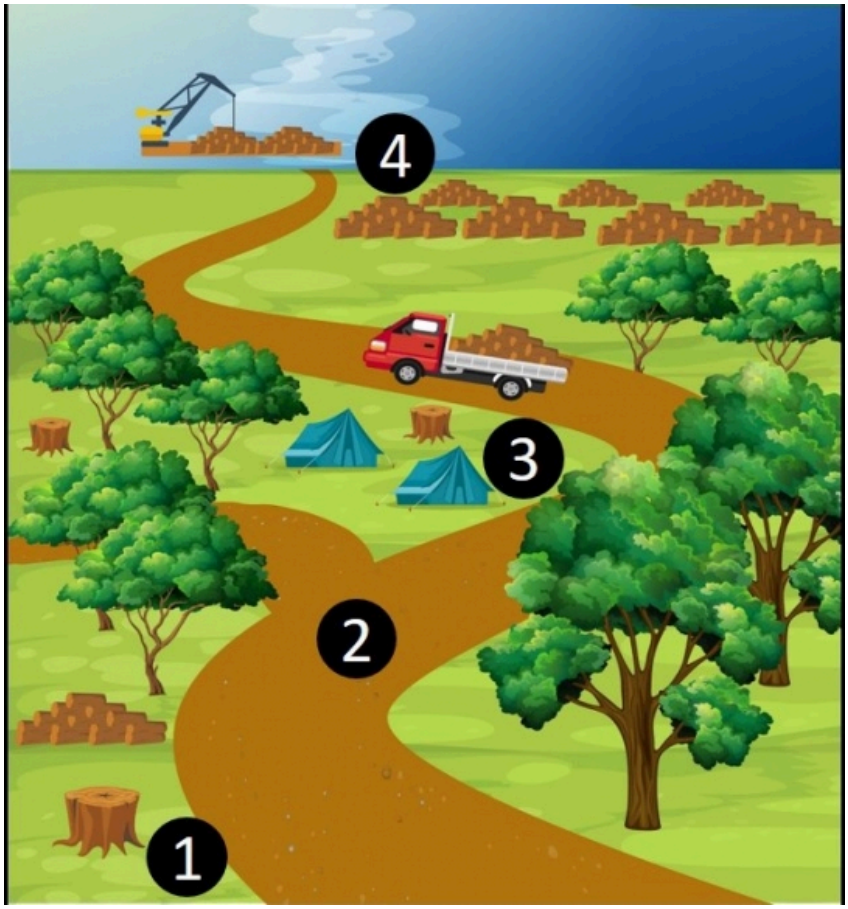
MAAP #94: Detecting Logging in the Peruvian Amazon with High Resolution Imagery

October 29, 2018



(https://www.maapprogram.org/wp-content/uploads/2018/09/Mapa_Base_v2b.jpg)

Base Map. Logging Activities. Source: ACCA/ACA.

In MAAP # 85 (https://www.maapprogram.org/2018/illegal_log/), we showed how medium and high-resolution **satellites** (such as Landsat, Planet and Sentinel-1) could be used to monitor the construction of logging roads in near-real time.

Here, we show the potential of **very high-resolution** satellites (such as DigitalGlobe and Planet's Skysat), to identify the activities associated with logging, including **illegal logging**.

These activities include (see **Base Map**):
1. **Selective logging** of high-value trees,
2. Construction of **logging roads** (access roads),

3. **Logging camps**
4. Storage and transport

Next, we show a series of very high-resolution images (>**50 centimeters**), which allow clear identification of these activities.

Note that we show images of both possible legal logging in authorized areas (Images 1,2,5,6,7,9,10) and **confirmed illegal logging** in unauthorized areas (Images 3,4,8,11,12).*

1. Selective logging of high-value trees

The following images (1-4) show examples of **selective logging**. Importantly, note that Images 3 and 4 show examples of confirmed **illegal logging**.

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_1_A_logging.jpg)

Image 1: Selective logging in a forestry area (Ucayali). Data: DigitalGlobe

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_2_logging.jpg)

Image 2: Selective logging in a forestry area (Ucayali). Data: DigitalGlobe

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_3_logging.jpg)

Image 3: Confirmed illegal logging in unauthorized area. Data: DigitalGlobe

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_4_logging.jpg)

Image 4: Confirmed illegal logging in unauthorized area. Data: DigitalGlobe

2. Construction of logging roads

The following images (5-8) show examples of the construction of **logging roads** for access to logging areas and subsequent transport of the wood to collection areas. In Image 7, note that it is possible to identify down to the level of logging trucks. Image 8 shows an example of an illegal logging path in an unauthorized area.

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_5_road.jpg)

Image 5. Logging road (Loreto). Data: DigitalGlobe

Image 6. Logging road (Ucayali). Data: DigitalGlobe

Image 7. Logging road and logging trucks. Data: Skysat (Planet)

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_8_A_road.jpg)

Image 8. Illegal logging path. Data: DigitalGlobe

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3. Logging camps

The following images (9-12) show examples of **logging camps**. Note that Images 11 and 12 show illegal camps in unauthorized areas.

Image 9. Logging camp in forestry area (Loreto). Data: DigitalGlobe.

Image 10. Logging camp in forestry area (Ucayali). Data: DigitalGlobe.

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_11_A_camp.jpg)

Image 11. Illegal logging camp in unauthorized area. Data: DigitalGlobe

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_12_camp.jpg)

Image 12. Illegal logging camp in unauthorized area. Data: DigitalGlobe

4. Storage and transport

The following images (13-15) show examples of large timber storage areas along major rivers, and the subsequent river transport by boat to the sawmills. In Figure 15, note that radar satellites (such as Sentinel-1) can relatively clearly identify timber transport ships.

Image 13. Timber storage area. Data: DigitalGlobe.

Image 14. Timber storage area. Data: DigitalGlobe.

(https://www.maapprogram.org/wp-content/uploads/2018/10/Img_15__transport.jpg)

Image 15. Detecting timber transport boats. Data: ESA (Sentinel-1B)

Annex

Before and after images. Here we show some of the images as above, but with an additional panel showing what the area looked like before the logging activity.

(https://www.maapprogram.org/wp-content/uploads/2018/10/Imagen1_Panel.jpg)

Image 1: Selective logging in a forestry area (Ucayali). Data: DigitalGlobe

(https://www.maapprogram.org/wp-content/uploads/2018/10/Image8_Panel.jpg)

Image 8. Illegal logging path. Data: DigitalGlobe

(https://www.maapprogram.org/wp-content/uploads/2018/10/Imagen10_Panel.jpg)

Image 10. Logging camp in forestry area (Ucayali). Data: DigitalGlobe.

(https://www.maapprogram.org/wp-content/uploads/2018/10/Imagen11_Panel.jpg)

Image 11. Illegal logging camp in unauthorized area. Data: DigitalGlobe

*Notes

We determined illegal logging by incorporating additional spatial information regarding forestry and conservation areas. Although very high resolution images allow the detection of activities related to selective logging, the determination of the legality of these activities often requires complementary and detailed information from the corresponding government entities.

Citation

Villa L, Finer M (2018) Detecting Logging in the Peruvian Amazon with High Resolution Imagery. MAAP: 94.