MAAP #34: New Dams on the Madeira River in Brazil Cause Forest Flooding

The Amazon lowlands have been connected to the Andes Mountains for millions of years by only six major rivers: the Caqueta, Madeira, Maranon, Napo, Putumayo, and Ucayali* (see **Image 34a**). This intimate connection allows rich Andean nutrients to fuel the Amazon floodplain and enables long-distance catfish migration between feeding grounds in the lowlands and spawning grounds in the highlands.

Image 34a. Data: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

However, one of these six major Andean tributaries has recently been dammed on its main channel: the **Madeira River in western Brazil** (See Inset A). The **Santo Antônio dam** was completed in 2011, followed by the upstream **Jirau dam** in 2013.

Note in Image 34a that these dams are are located downstream of the Madre de Dios River in southern Peru. Thus, major ecological impacts -- such as blocking the route of **migratory catfish****-- are also very relevant to Peru.

Here in **MAAP #34**, we describe the forest loss—over **36,100 hectares—**associated with the **flooding caused by these two dams** (with a focus on the Jirau dam).

Zoom A: Forest Loss due to Flooding

Image 34b shows the forest loss due to flooding immediately upstream of the Jirau dam. As of 2015, the **total flooded area** for both dams is **36,139 hectares** (89,301 acres). Major flooding was first detected in 2010, rose substantially in 2011-12, and peaked in 2014.

According to [Fearnside 2014](#), although much of the forest along the Madeira is seasonally flooded, it dies when permanently flooded.*** Therefore, the flooded area is an appropriate measure of forest loss.

Further below, we show a series of satellite images of the areas indicated by **Inset B** (see Images 34c-e) and **Inset C** (see Image 34f).
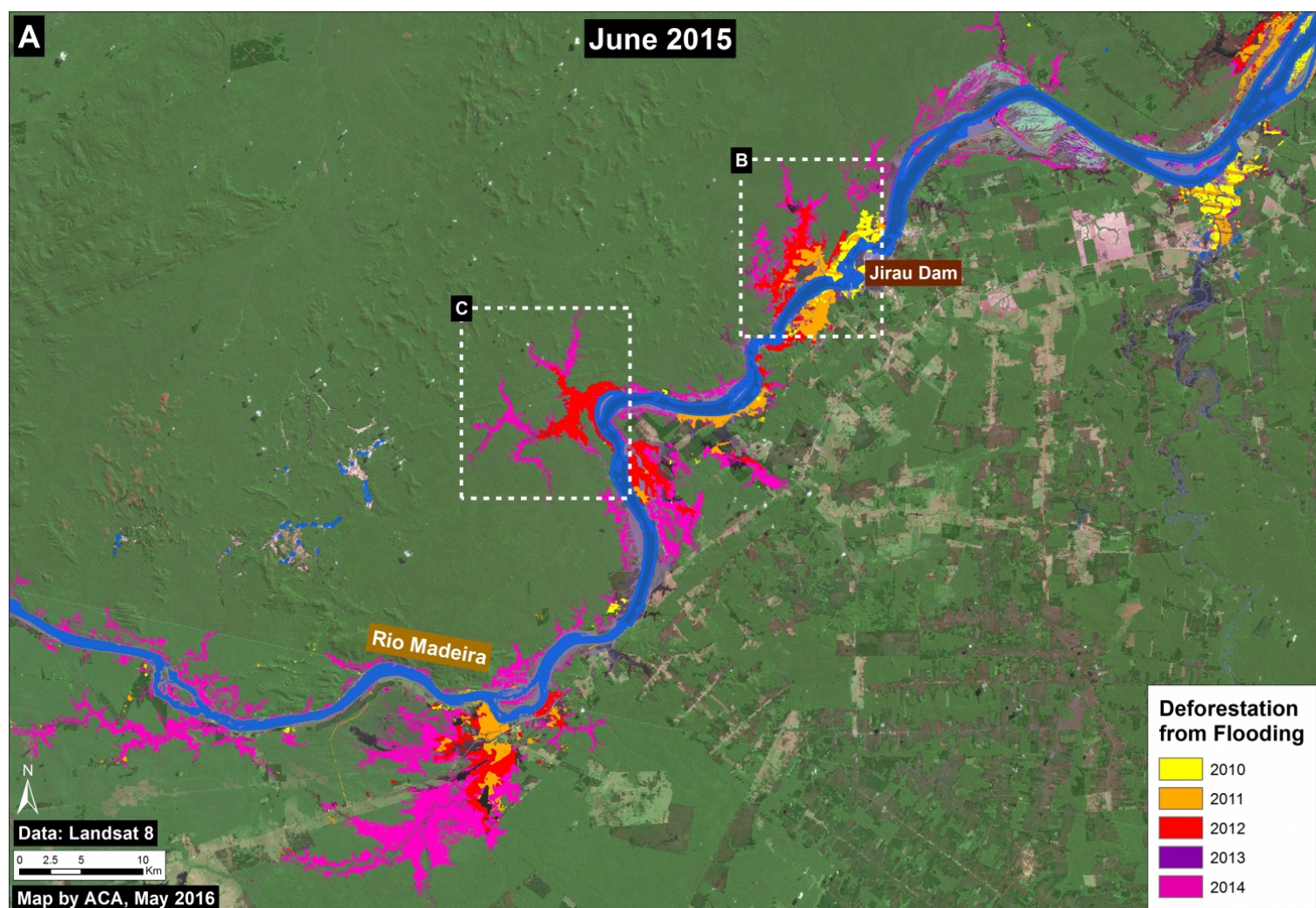

Image 34b. Flooding-related forest loss along the Upper Madeira River. Data: USGS, CLASlite, Hansen/UMD/Google/USGS/NASA.

Zoom B: Flooding Immediately Upstream Jirau Dam

Image 34c shows the flooding immediately upstream of the Jirau dam between 2011 (left panel) and 2015 (right panel). The red dot is a point of reference that indicates the same place in both images. Below, we show high-resolution images of the areas indicated by Insets B1 and B2.
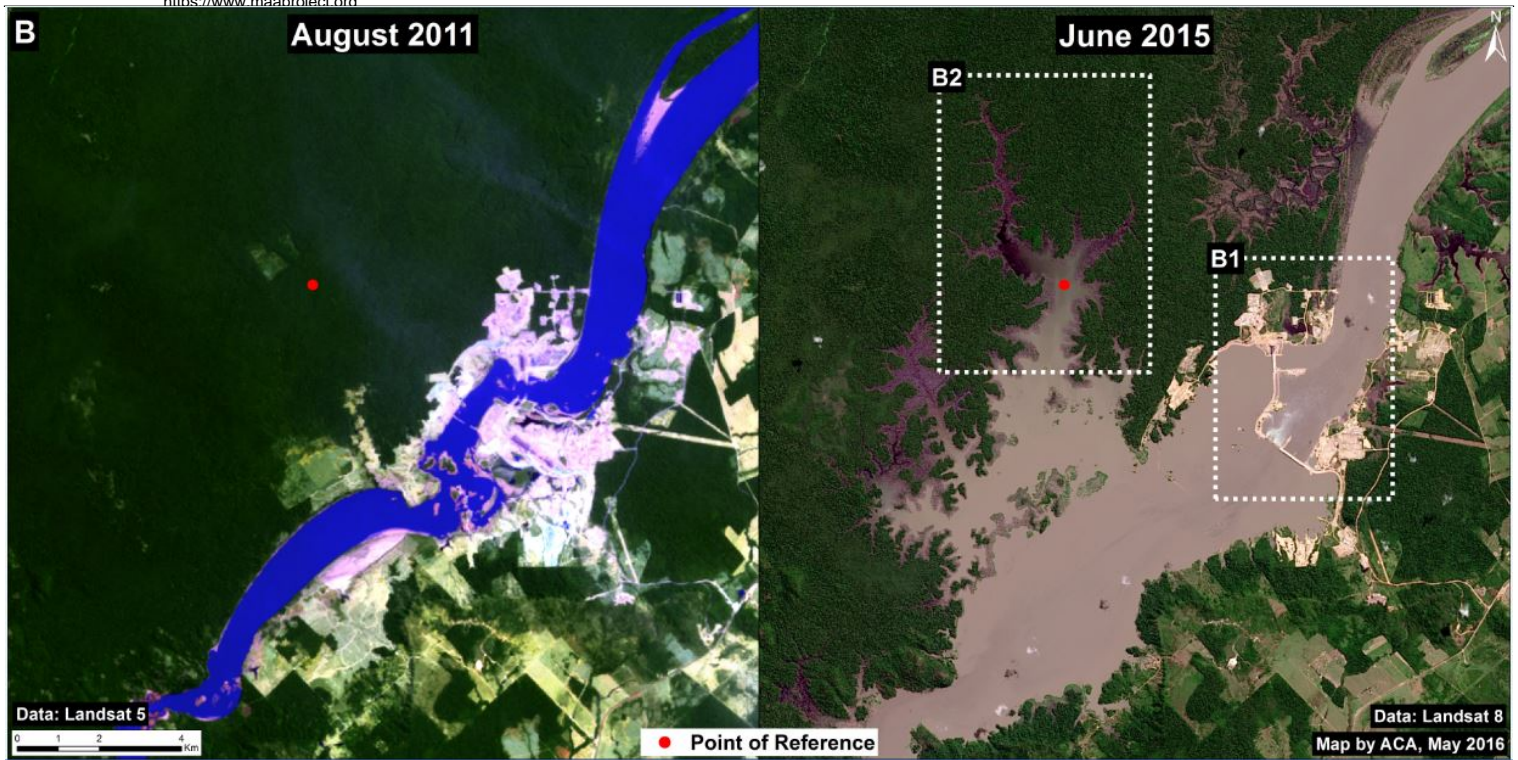
Image 34c shows the flooding immediately upstream of the Jirau dam between 2011(left panel) and 2015 (right panel).

Zooms B1 and B2: Jirau Dam and Flooding

Image 34d shows a high-resolution view of the Jirau dam in July 2015. **Image 34e** shows a high-resolution view of a portion of the flooded area immediately upstream of the Jirau dam in August 2015. The red dot is a point of reference that indicates the same place in both panels.

Image 34d. High-resolution view of the Jirau dam. Data: WorldView-2 from Digital Globe (NextView).

Image 34e: High-resolution view of flooded area immediately upstream of the Jirau dam. Data: WorldView-2 from Digital Globe (NextView).

Zoom C: Flooding Further Upstream of Jirau Dam

Image 34f shows the flooding further upstream of the Jirau dam between 2011 (left panel) and 2015 (right panel). The red dot is a point of reference that indicates the same point in both images.
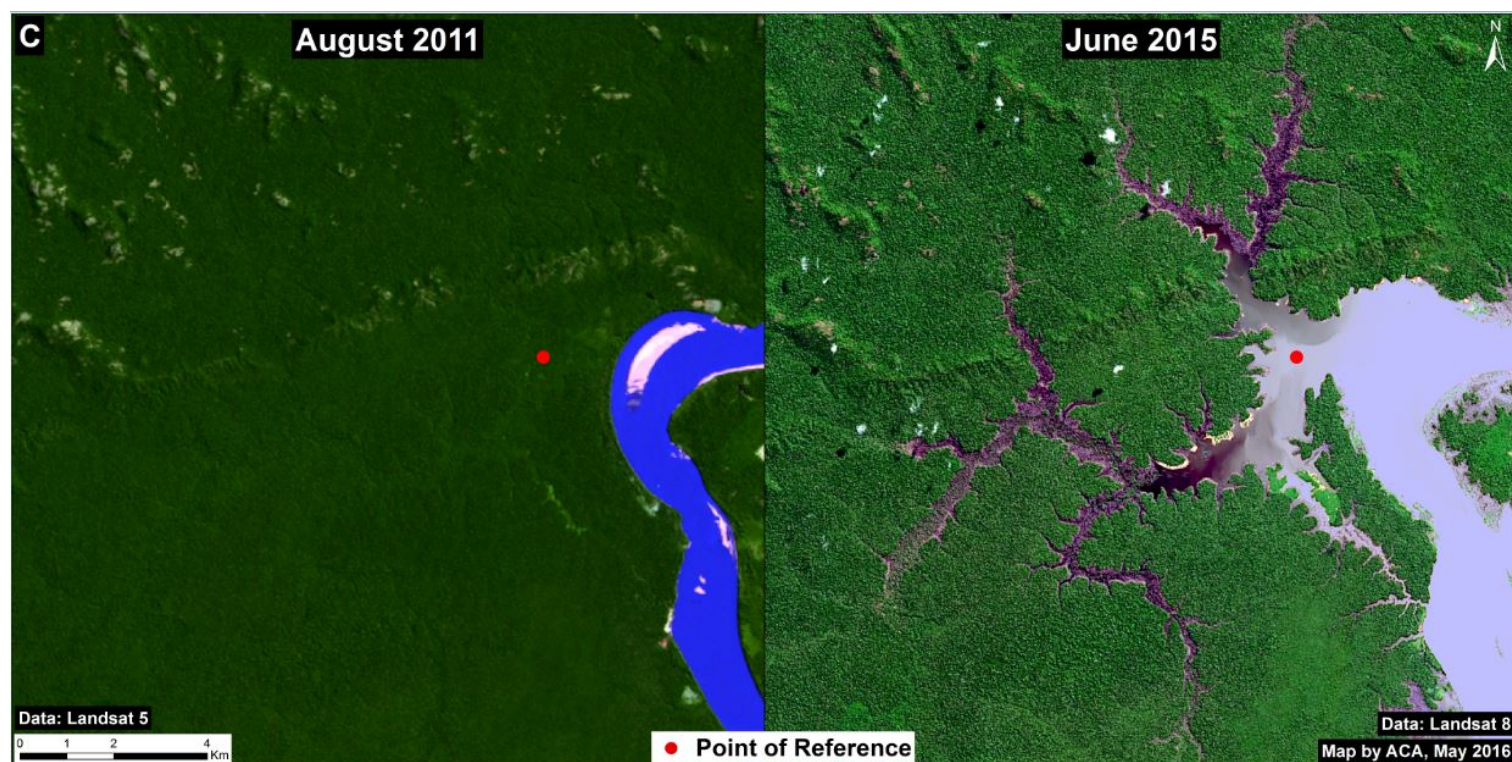

Image 34f. Forest flooding further upstream of the Jirau dam between 2011 (left panel) and 2015 (right panel). Data: USGS

References

*Finer M, Jenkins CN (2012) Proliferation of Hydroelectric Dams in the Andean Amazon and Implications for Andes-Amazon Connectivity. PLOS ONE: 7(4): e35126. Link: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0035126

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Citation

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