

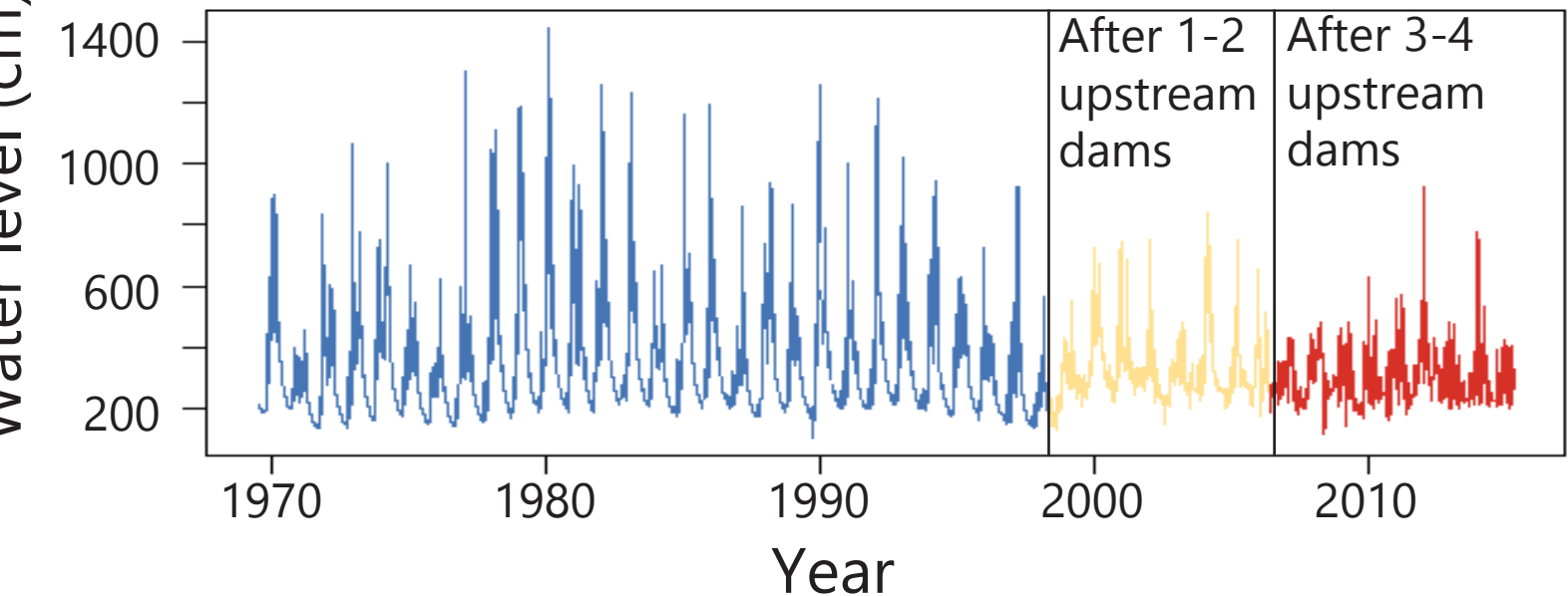
# Measuring changes to floodplains after serial damming of the Tocantins River in the eastern Amazon

## Background

**30** Operational mega dams in the Amazon (ANEEL 2019)



These dams drastically change river dynamics, including daily water level



Floodplain forests are essential for:

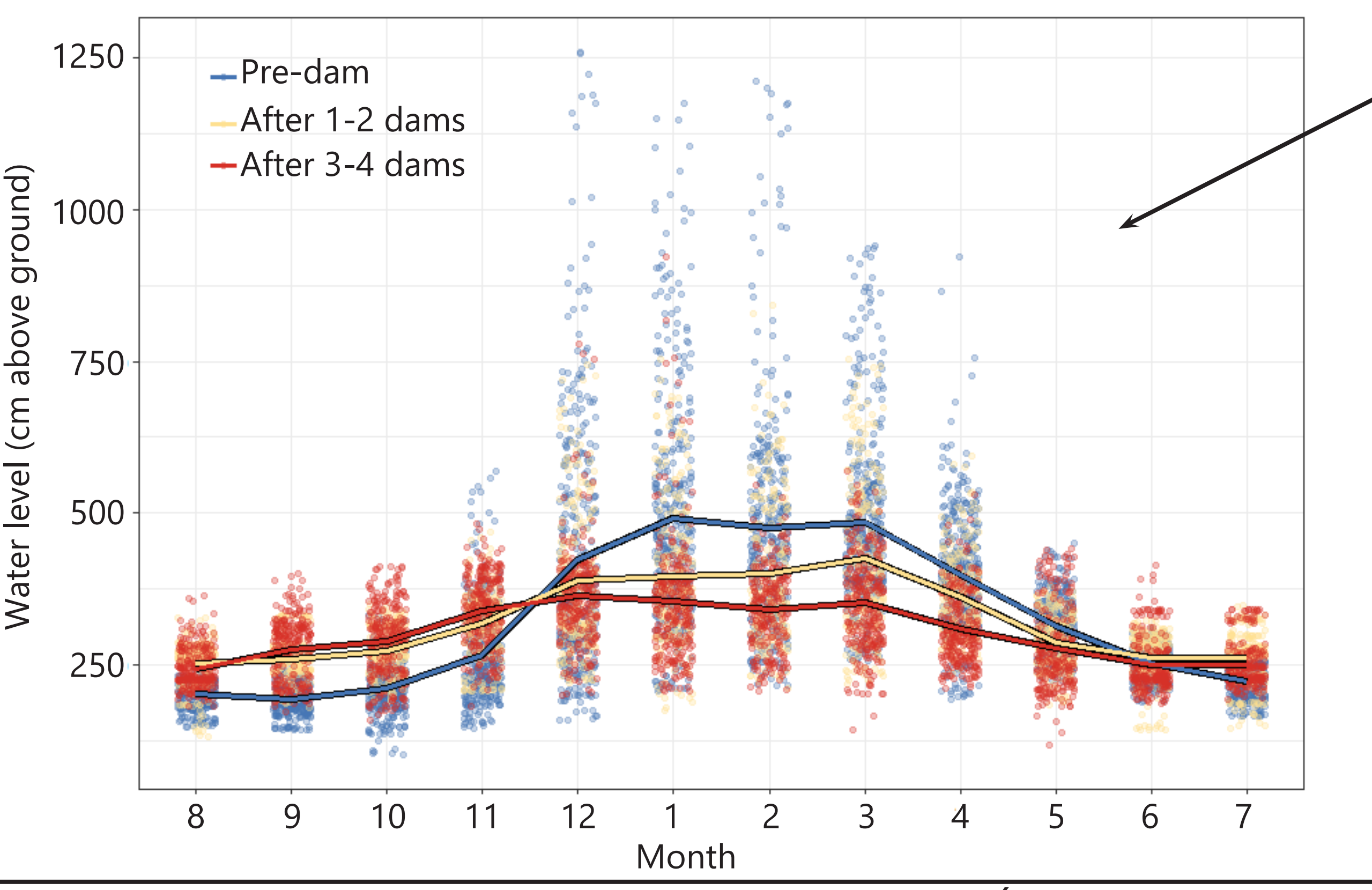
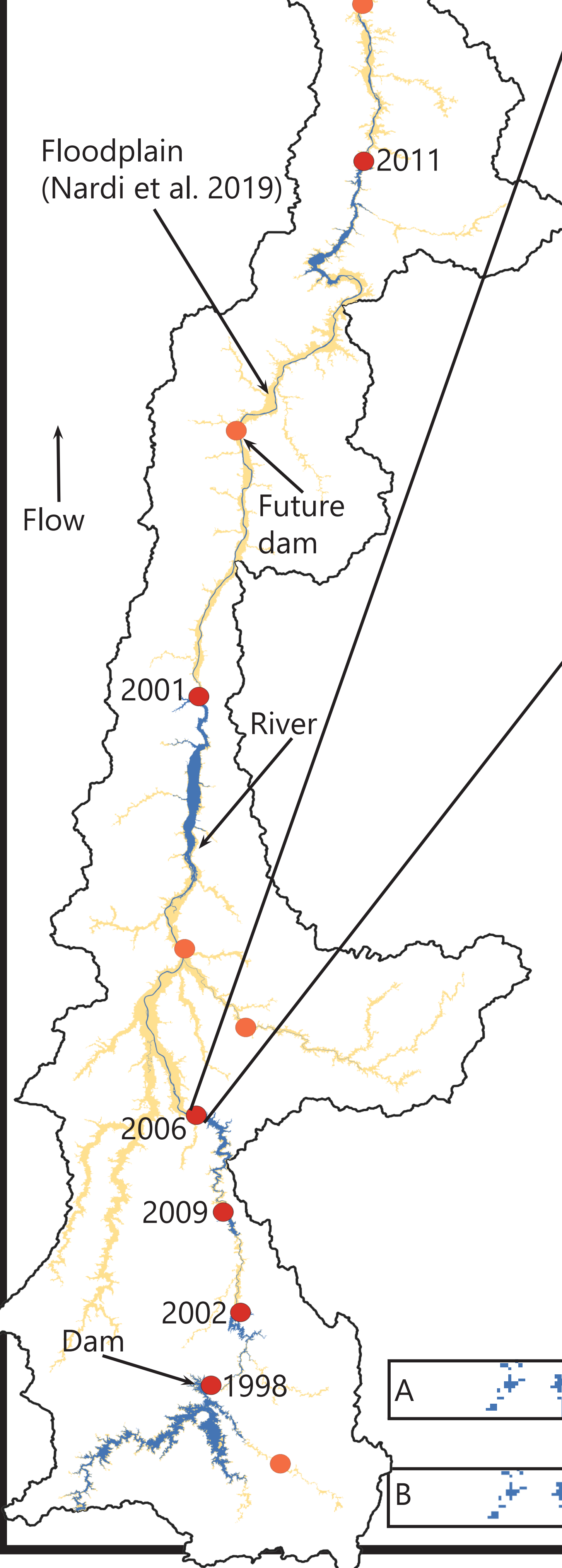
- nutrient uptake
- climate regulations
- flood mitigation
- erosion/sediment control
- upkeep of biodiversity

## Main Findings

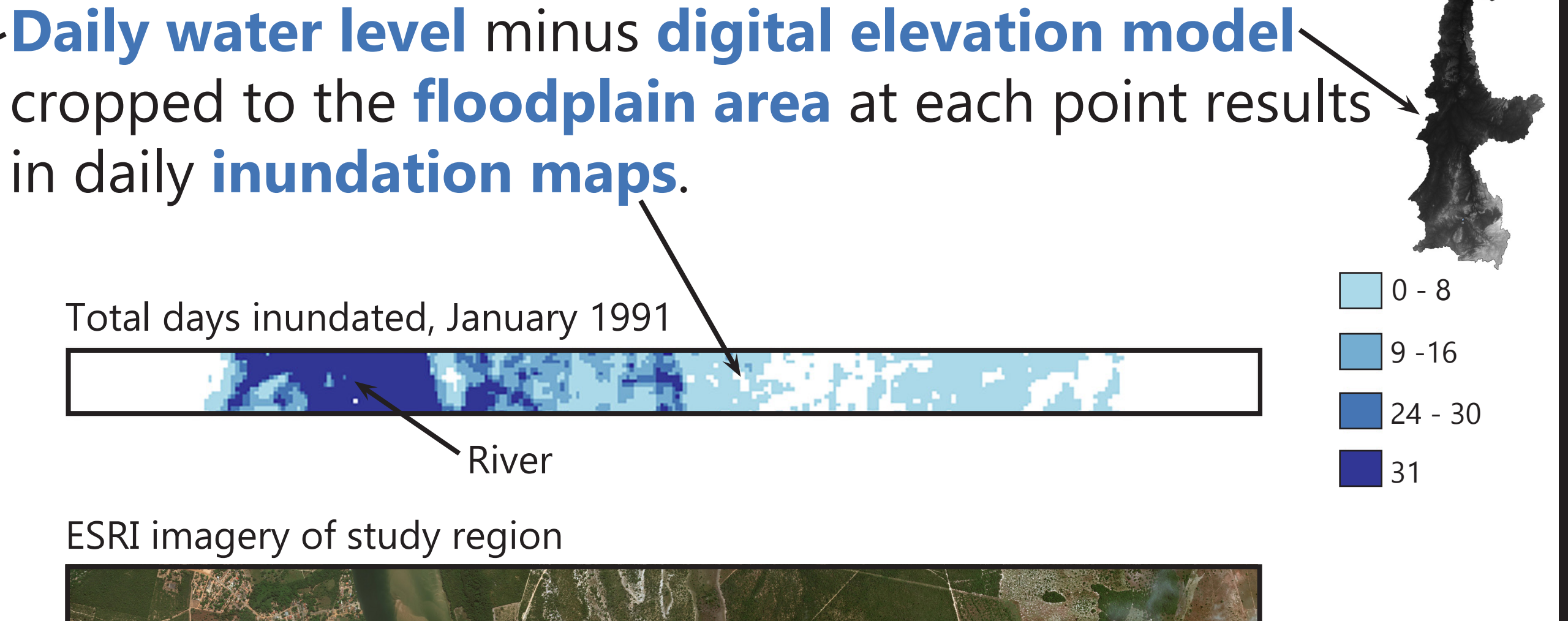
- After the installation of 1 dam, 1.41 million m<sup>2</sup> of the floodplain shown below no longer flooded. An additional 1.38 million m<sup>2</sup> of floodplain was inundated for less time.
- Changes to the floodplain are spatially and temporally explicit
- During the dry season, 190,800 m<sup>2</sup> near the river had an increased inundation time of 8 days after one dam was installed.
- In the wet season, the floodplain became drier, and the installation of additional dams worsened the drying



## How does the installation of multiple dams across a river change flood duration and floodplain extent?

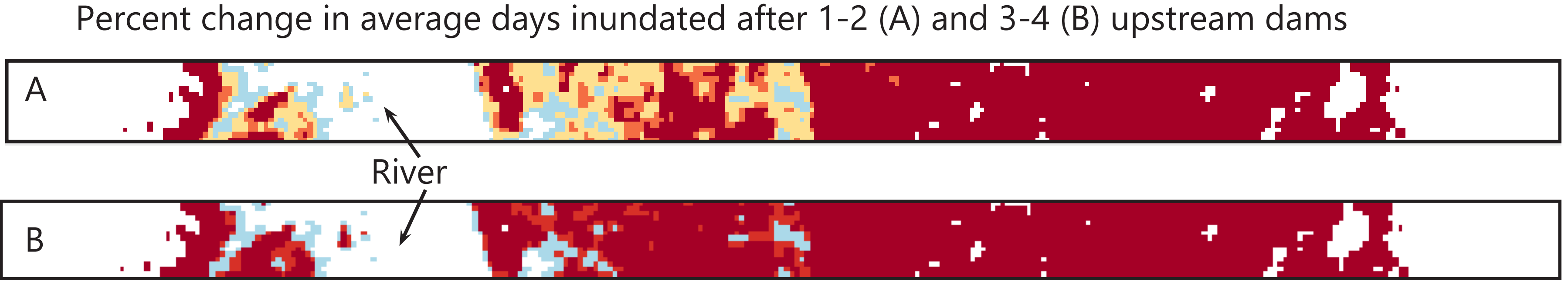


Daily level data from Agência Nacional das Águas.



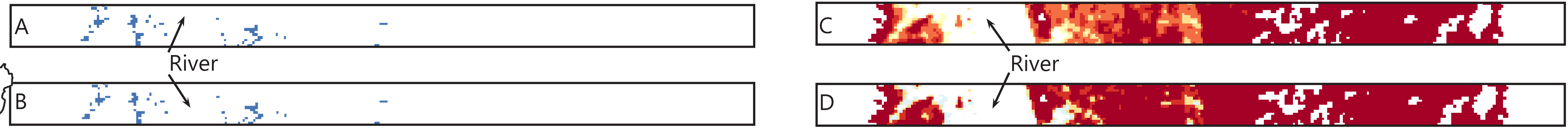
Maps were aggregated at monthly and yearly intervals, before and after damming. Pre-dam maps were subtracted from post-dam maps to better understand changes in floodplain extent and flood duration after damming.

## Difference in Yearly Inundation



## Dry Season (August) vs. Wet Season (January)

Percent change in total days inundated in the dry (A,B) vs. wet (C,D) season after 1-2 (A,C) and 3-4 (B,D) upstream dams



## Future Directions

- Measure changes to floodplain extent through use of synthetic aperture radar
- Model how climate and land cover change may be affecting flooding patterns in the Tocantins
- Use the results of this study to better understand how changes in flooding affect riparian forest throughout this floodplain, including changes to NDVI and total floodplain forest extent

