Changes in floodplains after serial damming of the Tocantins River in the eastern Amazon

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The flood pulse concept:

Regular flood regimes drive the ecology of floodplains and allow different species to flourish

How does changing a river’s hydrologic regime affect floodplain extent, flood timing, and flood duration?
Precipitation

Dams

Land cover

Hydrology

Flood extent

Flood timing

Flood duration
• Difference between post- and pre-dam floodplains

• Warm colors indicate a loss in hydroperiod
• Cool colors indicate a gain in hydroperiod
• During the wet season, the post-dam floodplain has a shorter hydroperiod and less area is inundated.

• But in the dry season, the post-dam floodplain becomes inundated for a longer amount of time.
Precipitation

Dams

Land cover

Flood extent

Flood timing

Flood duration
• Annual precipitation data from the Climate Research Unit

• Similar analysis as Costa et al. (2003)
- Specific discharge = total discharge/total area

- Graph represents the % precipitation that goes to the river as runoff
Next Steps

- Add sites throughout the watershed to determine effects with additional dams
- Relate changes in the floodplains to changes in forest phenology
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Questions?