

Conservation works: Forests for water in eastern Amazonia

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Image of Xingu watershed collected by the Envisat/MERIS satellite in May of 2006 by the European Space Agency (ESA).

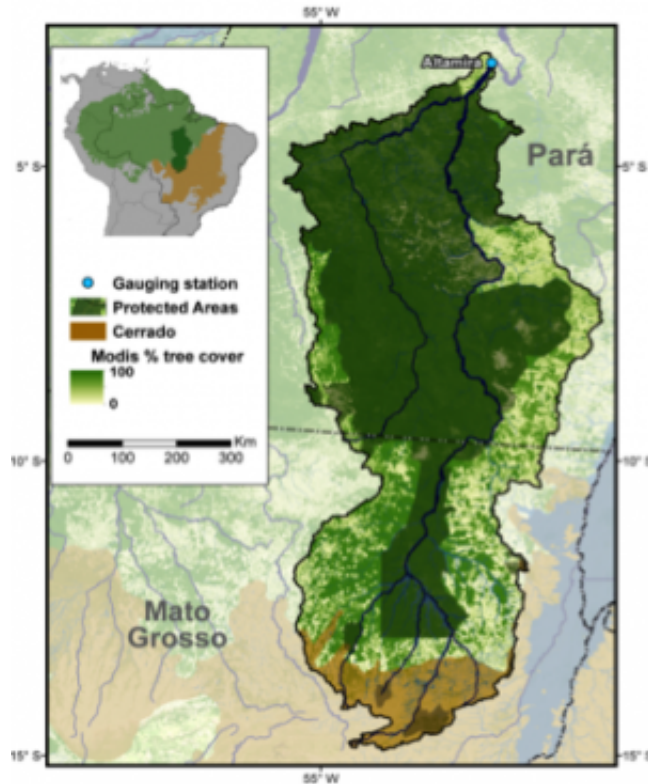
Brazil's 'arc of deforestation' accounted for 85% of all Amazon deforestation from 1996 to 2005. Although deforestation rates have dropped considerably since 2005, the forests of the southeastern Amazon remain vulnerable to expanding development, which affects the

amount of water cycled through the climate system in the region and exacerbates the effects of climate change. A new study published in the *Journal of Hydrology* led by WHRC scientist Prajjwal Panday found that large protected areas in the Xingu River Basin have helped shield this Amazonian watershed from the effects observed in its less-protected neighbor, the Araguaia-Tocantins.

The headwaters of the Xingu River are found in the savanna region of Mato Grosso state, the river flows northward through the rainforest before reaching the Amazon River at the city of Altamira. The Xingu watershed covers over 300,000 square miles, over half of which is protected as indigenous lands or nature reserves. The Mato Grosso portion of the basin is under the greatest threat from [deforestation](#) due to expanding agricultural activities.

"Our results show where deforestation has occurred the [water](#) cycle has been greatly altered, but that the protected areas have affectively limited the negative impacts of expanding agriculture to the southern portion of the basin," notes Panday.

In order to isolate the effects of deforestation on the Xingu Basin water balance from the effects of natural climate variation, the team of scientists combined fieldwork, satellite data, and dynamic vegetation models to simulate the water budget. The measurements included changes in the discharge of the Xingu at its confluence with the Amazon River, and satellite measurements of water recycling to the atmosphere and water stored in soils. The team found that changes from deforestation have been small so far, with slightly less recycling of water to the atmosphere and more flowing through soils to the river. Interestingly, climate variations over this same period had the opposite effect on water recycling, soil moisture, and stream flow.



Protected areas within the Xingu watershed. Credit: Prajjwal Panday

However, this paper suggests that expanding deforestation combined with climate change could have catastrophic consequences to water recycling in the Xingu Basin. "This study shows just how important forests are in regulating river flows. Recent reports of a 60% increase in Brazil's [deforestation rates](#) make it clear that we need to redouble our efforts to keep forests standing." notes study coauthor Marcia Macedo.

According to Dr. Michael Coe, "The bottom line is that protected areas work. By limiting agriculture to a relatively small fraction of the entire watershed, major changes in the [water cycle](#) have been avoided - other watersheds have not been so well protected and are suffering as a result. This is extremely important for Xingu indigenous people, biodiversity, and hydroelectric power generation by the Belo Monte dam at Alta

Mira."

Provided by Woods Hole Research Center

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