



EVARISTO SA/AFP/GETTY IMAGES/NEWSCOM

Less juice? Belo Monte Dam may not generate as much electricity as expected if deforestation in the Amazon Basin continues.

Study of Controversial Dam Reveals Hidden Dependence on Rainforest

Tweet Share { 1 } G+ { 15 }

By [Erik Stokstad \(/author/erik-stokstad\)](#) | 15 May 2013 1:30 pm | [0 Comments \(/climate/2013/05/study-controversial-dam-reveals-hidden-dependence-rainforest#disqus_thread\)](#)

Hydropower dams may be an unlikely new weapon for conservationists trying to save tropical trees. A new study reveals that vast forests are necessary to keep rivers flowing and turbines spinning. Without them, the dams produce significantly less power than they would otherwise. "The idea that protecting

tropical forest is necessary for sustainable hydropower is a new argument," says Kathryn Hochstetler of the Balsillie School of International Affairs and the University of Waterloo in Canada. The findings could encourage forest conservation, she says, but they might also encourage construction of dams that are more damaging to the local environment.

Brazil generates about 80% of its electricity from dams, and the government is planning a lot more. For example, when engineers complete the \$14 billion Belo Monte Dam on the Xingu River in Para state, it will have the third greatest capacity for generating hydropower in the world. But opponents of the dam worry about its environmental impacts, including harm to fishes and flooding of land for its reservoir. The original design called for five reservoirs that would have destroyed 1225 km² of forest. Because of objections, the design was changed to a single reservoir of 441 square kilometers.

The common wisdom among engineers, however, is that deforestation isn't necessarily bad for hydropower. As long as erosion doesn't silt up the reservoir, cutting trees should actually improve electricity generation. That's because trees take up a lot of water from the soil and send it into the atmosphere through a process known as evapotranspiration. Remove the trees, the thinking goes, and the ground contains more water, which eventually trickles into streams and ends up swirling through the turbines in a dam downstream.

But there is a larger picture. Growing evidence suggests that [rainforests help keep rivers flowing](http://www.whrc.org/resources/publications/pdf/CoeetalJHydro.09.pdf) (<http://www.whrc.org/resources/publications/pdf/CoeetalJHydro.09.pdf>). The massive amount of moisture that they send into the air—much more than from crops or pasture—creates regional weather patterns that lead to rain storms over the forest. Claudia Stickler, a geographer with Brazil's Amazon Environmental Research Institute (AERI), who is based in San Francisco, California, and her colleagues examined what deforestation would mean for the Xingu River and its potential for hydropower.

It matters where the trees are cut, they found. Deforestation within the Xingu watershed did indeed boost river flow, by up to 12%. But according to their climate and hydrological models, this boost is undercut by the impact of continued deforestation throughout the Amazon watershed as a whole. By 2050,

[the continued loss of trees will inhibit storms and slacken the Xingu's flow by up to 36% \(http://www.pnas.org/cgi/doi/10.1073/pnas.1215331110\)](http://www.pnas.org/cgi/doi/10.1073/pnas.1215331110), the team reports online this week in the *Proceedings of the National Academy of Sciences*. That would mean 40% less power than the dam-builders are predicting.

Things may not be quite that bad. The scenario for deforestation was based on data from 1995 to 2006. Since then, the rate of tree cutting has fallen 76% from the 10-year average and continues to decline. "This research would provide one more reason to redouble those efforts and try to prevent backtracking," Hochstetler says. The authors say the results are widely applicable. "Clearly there's potential that [the results are] relevant for other tributaries for which hydropower dams are being planned," says co-author Daniel Nepstad of AERI.

The worry is that the prospect of less reliable hydropower will mean that engineers will be more likely to design large reservoirs to guarantee water pressure for electricity generation. Wilson Cabral de Sousa Júnior, an environmental economics specialist at the Technological Institute of Aeronautics in São José dos Campos, Brazil, points out that it would be legally simple for the government to decide to add more reservoirs to the Xingu River.

Posted in [Environment \(/category/environment/\)](/category/environment/), [Climate \(/category/climate/\)](/category/climate/)

Tweet

Share

1

G+1

15

Please note that, in an effort to combat spam, comments with hyperlinks will not be published.

0 Comments

ScienceNow

 Login ▾

 Recommend

 Share

Sort by Best ▾



Start the discussion...

Be the first to comment.

ALSO ON SCIENCENOW

WHAT'S THIS?

Dinosaurs may have danced like birds to woo mates

1 comment • a day ago

cybernetichero — Thinking of flamingos and imagining a herd of multi-tonne animals doing that.

Roman toilets may actually have been bad for public health

3 comments • 17 hours ago

Doug Huffman — So it was not the evil plumbum that led to the Roman decline?

The mystery of the naked black hole

8 comments • 3 days ago

Robert Oldershaw — Thanks for the support, Mike. I think the best science journalism does not dumb down or over-hype the material. ...

Brain game maker Lumosity fined \$2 million for false advertising

13 comments • 3 days ago

Linas Juozėnas — All the tv advertisements should be fined, especially about the drugs. Sure, when it comes to the brain and ...

 Subscribe

 Add Disqus to your site [Add Disqus](#) [Add](#)

 Privacy