New research quantifies ecosystem services provided by Amazon rainforest

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- *New research published in the journal Nature Sustainability this month attempts to establish the monetary value of the ecosystem services provided by the world's largest tropical forest, the Amazon.*
- *Researchers estimated that, in total, the Amazon contributes as much as $8.2 billion to Brazil's economy on an annual basis. Some $3.3 billion of that total is generated from privately owned forest areas, they found, while areas under protection, sustainable use areas, and indigenous lands together contribute $3 billion.*
- *In the study, the researchers write that their findings can help inform tropical forest conservation measures, such as Payments for Ecosystem Services (PES) schemes, that allow for sustainable use of forests — and that their findings show the importance of conserving the rainforest not only to protect its rich biodiversity but also to ensure the sustainability of agricultural production in Brazil.*

New research published in the journal Nature Sustainability (https://doi.org/10.1038/s41893-018-0175-0) this month attempts to establish the monetary value of the ecosystem services provided by the world's largest tropical forest, the Amazon.

A research team led by Jon Strand of the World Bank and Britaldo Soares-Filho, a professor at Brazil's Federal University of Minas Gerais (UFMG), estimated the economic contributions of a range of ecosystem services furnished by the Brazilian Amazon, including food production (specifically, the collection of Brazil nuts), provision of raw materials like rubber and timber, carbon sequestration, and regulation of the regional and global climate.

According to the study, in some regions of the Amazon the deforestation of just one hectare can lead to the loss of $40 in Brazil nut production and $200 in sustainable timber production per year. Keeping the forest standing, meanwhile, can generate as much as $737 dollars per hectare every year in some areas.

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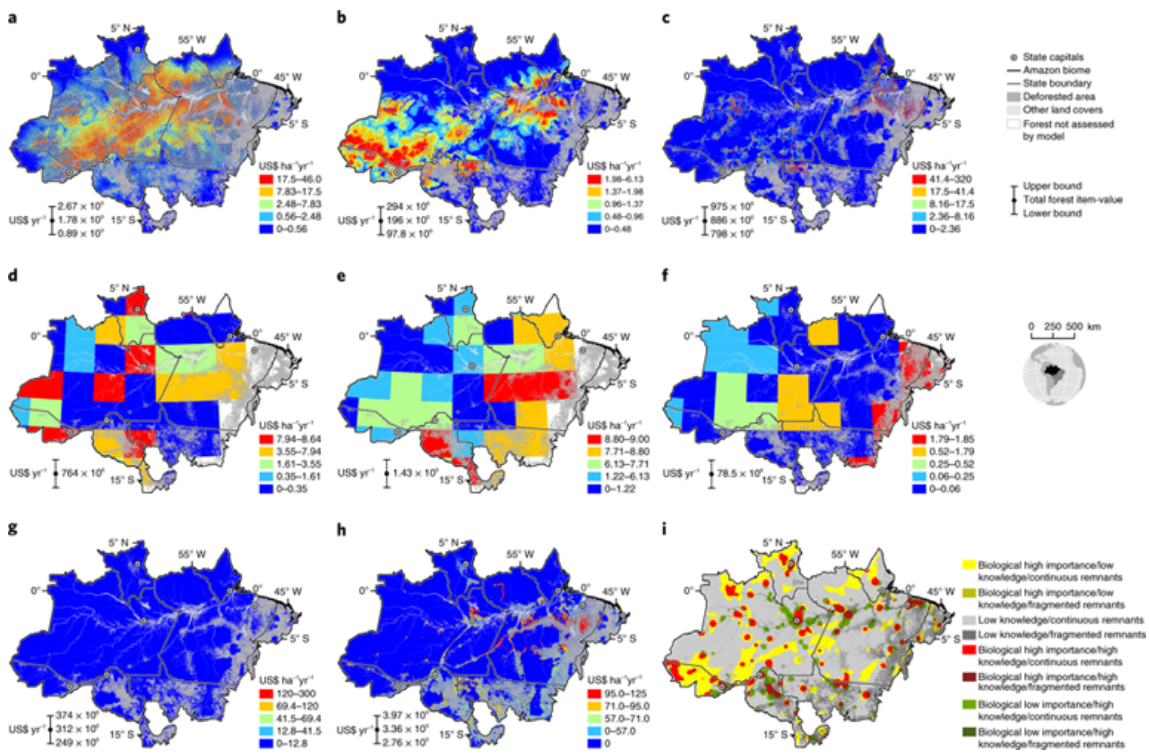


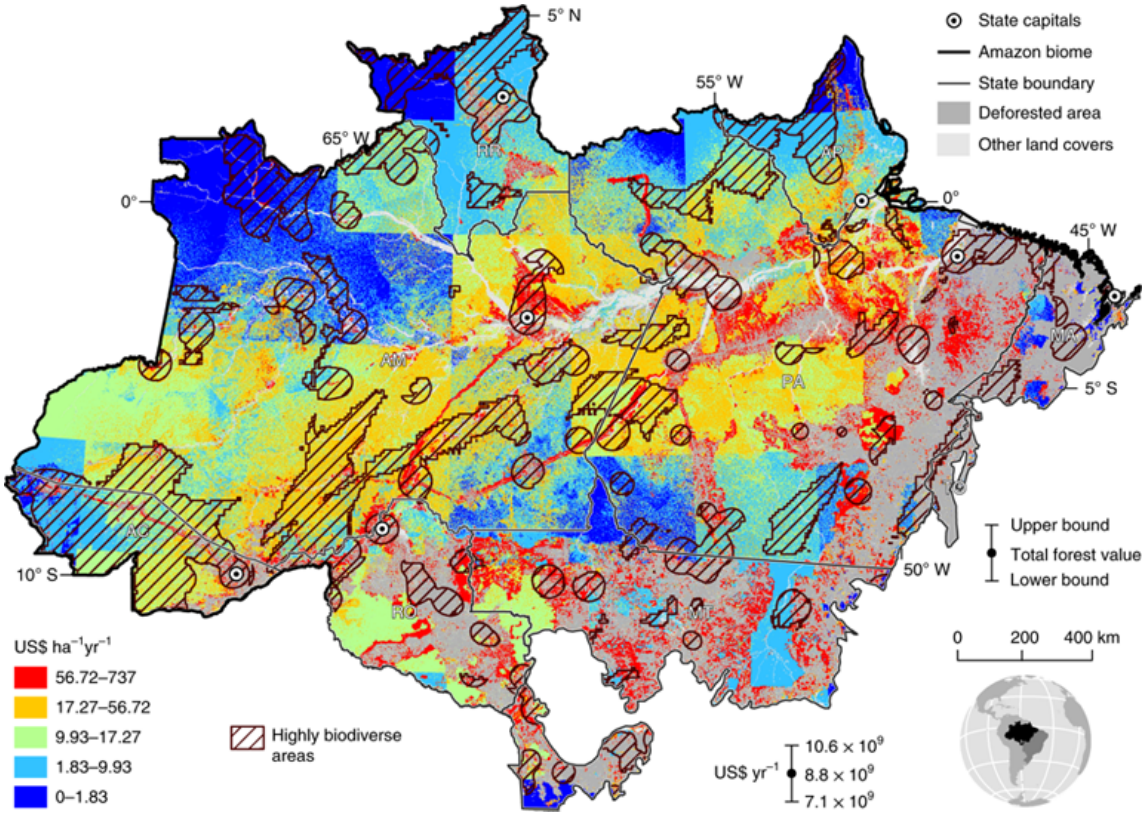
***Forest values for individual value components**. Value maps for brazil nut (a), rubber (b), timber (c), soy* (d), livestock* (e), energy* (f), fire losses to timber (g), CO2 emission reductions (h) and biodiversity relevant areas (i). Values are presented in EAA (30-year period with a discount rate of 5%). The value of CO2 abatement is set at US$5 per tonne. Soy*, Livestock* and Energy* refer to their marginal value not lost by keeping vegetation standing. Bar diagrams depict overall value for valuation component and associaeted uncertainly bounds when available. Credit: Soares-Filho et al. (2018). doi: 10.1038/s41893-018-0175-0*

There are still some 340 million hectares (more than 840 million acres) of forested areas in the Brazilian Amazon, of which 62 million hectares are still non-designated and at risk of occupation by private interests. These undesignated areas provide another $1.9 billion per year to the Brazilian economy, the study found. Deforesting those 62 million hectares, meanwhile, could pose a serious threat to agricultural production, as it would reduce rainfall and thus drive agricultural production losses of $422 million annually — equivalent to 35 percent of the total net profits reaped by the soy industry in Mato Grosso state, Brazil's main producer of the crop.

"The standing forest is much more valuable than the clearing, especially if we compare its benefits to society as a whole to the value obtained when appropriated by the few," Soares-Filho said in a statement. He added that it was not possible for the study to even quantify the full range of environmental services provided by the Amazon: "We work with values that are measurable. There are environmental services of the Amazon Forest that we can not even imagine, such as those related to the genetic patrimony that is still unknown."

The researchers mapped high-value ecosystem services and highly biodiverse areas of the Amazon, and have made all of the results of the study available on a publicly accessible website, amazones.info (http://amazones.info). In the study, the researchers write that their findings can help inform tropical forest conservation measures, such as Payments for Ecosystem Services (PES) schemes, that allow for sustainable use of forests — and that their findings show the importance of conserving the rainforest not only to protect its rich biodiversity but also to ensure the sustainability of agricultural production in Brazil.

"Valuing ecosystem services may inform the implementation of mechanisms, including payment for ecosystem services," they write, "but its importance is further reaching. Monetary valuation of forest ecosystem services can assist policy-makers in managing different elements of human wellbeing, thus providing the basis for both economic and environmental sustainability."



Forest values overlaid with highly biodiverse areas. *Values are presented in EAA (30-year period with a discount rate of 5%). Overall value map is a linear sum of value items cell by cell. Bar diagram depicts overall forest value and associated uncertainty bounds. Credit: Soares-Filho et al. (2018). doi:10.1038/s41893-018-0175-0*

Soares-Filho teamed up with fellow UFMG professor Raoni Rajão to write a commentary that was published in the same issue of Nature Sustainability (https://doi.org/10.1038/s41893-018-0179-9) as the study. In that paper, the two authors note that, after declining by 84 percent between 2004 and 2012, deforestation in the Amazon is once again on the rise, largely due to agribusiness interests' successful efforts to weaken Brazilian environmental laws. What's more, "The conservation movement has lost its critical edge by befriending agribusiness," they argue.

"Higher productivity is an agricultural goal, not a conservation priority. Nevertheless, sustainable intensification of beef production has been promoted and even carried out by conservation practitioners, supported by conservation funding and with the aim of reducing the impact of cattle ranching on forest clearing and greenhouse gas emissions," Soares-Filho and Rajão write. "Meanwhile part of the conservation movement, drawn to enlist the most powerful force on the planet, the global markets, welcomed agribusiness companies at roundtables to promote clean supply chains (products with no associated deforestation)."

In plotting the way forward, Soares-Filho and Rajão call for a return to "traditional" conservation interventions:

"Rather than delaying actions through protracted negotiations with agribusiness or assisting cattle-ranching intensification, the conservation movement should get back to basics," the researchers contend. "To this end, conservation and climate change mitigation resources should be invested principally in what has proven successful, mainly government regulation, monitoring and enforcement, and blaming and shaming actions. ... Finally, PAs are still the main conservation tool and there remain 40 [million hectares] of undesignated land in the Amazon that must become protected (for example, national forests) to forestall land grabbing."

A handful of raw Brazil nuts, which the researchers looked at specifically because they are widely collected across the Amazon and have a stable presence in markets. Photo by Rhett Butler.

CITATIONS

• Strand, J., Soares-Filho, B., Costa, M. H., Oliveira, U., Ribeiro, S. C., Pires, G. F., ... & Siikamäki, J. (2018). Spatially explicit valuation of the Brazilian Amazon Forest's Ecosystem Services. Nature Sustainability, 1(11), 657. doi:10.1038/s41893-018-0175-0 (https://doi.org/10.1038/s41893-018-0175-0)

• Soares-Filho, B., & Rajão, R. (2018). Traditional conservation strategies still the best option. Nature Sustainability, 1(11), 608. doi:10.1038/s41893-018-0179-9 (https://doi.org/10.1038/s41893-018-0179-9)