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Indonesia’s pulp sector risks reversing progress toward zero deforestation

You might be surprised to learn that rayon, the soft, breathable fabric many people have come to love, is often derived from wood pulp. Wood pulp is made by breaking wood down into its fibers, which can then be pressed into paper or spun into thread. Much of that pulp comes from plantations in Indonesia, where it becomes common household goods sold around the world: paper, tissue, packaging and, yes, clothing.

Growing these plantations has often meant clearing tropical forests that have stood for centuries, including forests on carbon-rich peatlands — wetlands composed of layers of partially decayed plant material. When burned, these peatlands release large amounts of stored carbon and produce smoke that has caused devastating health impacts across the region.

So far, Indonesia’s pulp sector has been a bright spot in the fight against tropical deforestation. A new study in Science, led by UC Santa Barbara’s Robert Heilmayr, finds that between 2011 and 2017, an industry that had been among the country’s biggest drivers of deforestation nearly stopped clearing forest altogether.

Since then, however, clearing for pulpwood has more than quadrupled. Heilmayr and colleagues from an international team used satellite information and supply-chain

records to examine how four interconnected factors — international incentives, domestic policies, productivity improvements and private zero-deforestation commitments — drove the decline in pulp-driven deforestation during the 2010s. With data showing deforestation again on the rise, they caution that lasting forest protection is not guaranteed, especially when progress depends on voluntary corporate pledges or short-term policies.

“Indonesia has shown the world that it’s possible to dramatically reduce deforestation,” said Heilmayr, an assistant professor at the Environmental Markets Lab (emLab). “The question now is whether that success can hold as demand for pulp continues to grow.”

How Indonesia’s pulp sector nearly reached zero deforestation

In the 1990s and early 2000s, a wave of new pulp mills made the industry one of the biggest threats to Indonesia’s natural forests. Clearing for plantations destroyed habitat for critically endangered species, sparked conflicts with local communities, and left exposed peatlands more prone to burning. Recurring fires blanketed Southeast Asia in haze. In 2015, one of the worst fire seasons on record burned more than 6.4 million acres. Mounting public outrage, from local communities to global consumers, pushed governments and companies to act.

That pressure paid off. Between 2011 and 2017, deforestation linked to pulp fell by 95%. Heilmayr and his team traced that decline to a mix of international incentives, government policies, more productive plantations and company pledges to stop clearing forests. While earlier studies examined individual policies one at a time, this study looked at how these factors worked together.

“There wasn’t a single policy that brought deforestation down,” underscored co-author Jason Jon Benedict, a project scientist at emLab. “It took an all-of-the-above approach.” What emerged was a portfolio of policies, backed by gains in productivity that made it easier for existing plantations to produce more wood per hectare without logging more of Indonesia’s natural forests.

At the same time, facing global incentives and domestic pressure, Indonesia’s government adopted reforms to protect forests and peatlands. The country’s two

largest pulp companies, Asia Pulp & Paper (APP) and Asia Pacific Resources International Limited (APRIL), also pledged to end deforestation in their supply chains, in 2013 and 2015, respectively. Together, those pledges made Indonesia’s pulp sector the first tropical commodity in which all national production was covered by zero-deforestation commitments.

Tracing Indonesia’s pulp supply chain

Since voluntary corporate pledges aren't enforceable by governments, independent monitoring is essential to ensure they’re being kept and policies work in practice. To track that progress, the team — which included researchers from Indonesia, the United States, France and Spain — mapped forest loss and plantation expansion from 2001 to 2022.

“Industrial acacia and eucalyptus plantations are relatively easy to detect from space,” said co-author David Gaveau, founder of The TreeMap, who led the remote sensing analysis. “By tracking where these plantations expanded, where they replaced natural forests and where planted trees were subsequently harvested, year after year, we were able to reconstruct the growth of this industry and document its impact on natural forests and peatlands.”

The researchers also combed through records to trace which plantation concessions supply which mills, and which corporate groups are linked to them. Finally, they measured how quickly plantation yields are improving, and used that to estimate how much new land the industry’s planned mill expansions would require.

Image



Photo Credit
Auriga Nusantara
An industrial forestry concession in East Kalimantan, Indonesia, photographed in 2026, where land was cleared for a pulpwood plantation.

Deforestation quadruples since 2017

After years as a major driver of Indonesia’s deforestation, the pulp sector had nearly ended new deforestation by 2017. But it now seems to be reversing course.

Forest clearing for pulpwood plantations rose from about 13,838 acres in 2017 to 60,047 acres in 2022, a more than fourfold increase. By 2022, more forest was being cleared for pulpwood than for industrial oil palm, a crop that has received far more attention for driving deforestation and peatland conversion in Indonesia. Additionally, more than half of the pulp-driven clearing between 2015 and 2022 occurred on land the researchers suspect is controlled by the parent groups of APP and APRIL, the two companies that pledged to end deforestation.

“Ownership in this sector can be hard to untangle,” said co-author Timer Manurung, executive director of Auriga Nusantara, an Indonesian NGO dedicated to conserving the country’s natural resources and the environment. “Tracing which concessions supply which mills, and who ultimately controls them, is essential for knowing

whether zero-deforestation commitments are being met.”

Pressure on forests is likely to intensify since the industry is expanding pulp mill capacity by nearly 80% to meet growing demand. Even if plantations continue increasing productivity, the team estimates the expansion could drive roughly 345,947 more acres of deforestation — an area larger than the city of Los Angeles — and convert nearly 494,210 acres of peatland.

Recent policy changes may make matters worse. A sweeping 2020 deregulation law rolled back many environmental protections, and the country issued new licenses that could open selectively logged forests to full plantation conversion.

“The current expansion of Indonesia’s pulp industry involves several billion dollars of capital investment in new production capacity,” according to Christopher Barr of nonprofit group Woods & Wayside International. “This will put enormous long-term pressures on forests and peatlands to deliver the massive increases in wood these



Photo Credit
Auriga Nusantara

A barge is loaded with pulpwood at an industrial forestry concession in East Kalimantan, Indonesia in 2026.

Holding companies to their pledges

The findings carry lessons well beyond Indonesia. Protections built on company pledges and temporary government bans can unravel when economic or political conditions shift. The stakes reach beyond forests: converting peatlands to plantations make them more vulnerable to burning, which releases carbon and worsens air pollution across Southeast Asia.

“Indonesia’s pulp sector shows both that ending deforestation is possible, but that this progress is fragile,” Heilmayr said. “Keeping forests and peatlands intact will take sustained effort from governments, companies and the buyers of paper and viscose products.”

The team plans to investigate whether, and how, companies may be sidestepping their promises to end deforestation. Two mechanisms stand out. The first is ownership and sourcing relationships that can obscure who is responsible for clearing. The second involves understanding loopholes in zero-deforestation pledges. Each company’s pledge includes a cut-off date, and wood from land cleared after that date is supposed to be excluded. APP and APRIL originally set those dates at 2013 and 2015, but last year shifted their cut-off dates to the end of 2020, so suppliers that cleared forest during those intervening years are now deemed compliant with the zero-deforestation pledges. These changes undermine the credibility of pledges, sending mixed signals to pulpwood producers about which might qualify as an approved supplier in the future.

“The stakes could not be higher,” Barr said. “To achieve zero deforestation in their supply chains, producers will have to accept independent monitoring of their wood supply and make sustainability commitments that can’t be rewritten after the fact.”

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