Silvopasture could tackle Colombian Amazon's high deforestation rates and help achieve COP26 targets

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A silvopastoral farm in Colombia, South America, where trees and forage plants are planted in livestock pasture. Credit: University of Bristol

A transition to silvopastoral systems (SPS), when implemented in a participatory way where farmers can decide how the system is adopted in their farms and make commitments to conserve remnant forests,

could help Colombia meet its greenhouse gas emissions targets for 2030 and protect the country's Amazonian forests.

Over the last 20 years, Colombia—the second most biodiverse country in the world, has lost more than 4.6million hectares of forest, partly due to the expansion of cattle farming, which in turn is related to complex historical, economic and political reasons. While a range of national and international agri-environmental projects aimed at reducing deforestation levels have been implemented in Colombia, until now their uptake and efficacy was not known.

The BioSmart project, comprising entomologists, economists, geographers, climate modelers and botanists, sought to assess biodiversity value in silvopasture compared with non-SPS conventional pasture sites. The team recorded the number of insects and plant species across 16 SPS farm sites in Caquetá, Colombia. An Amazonian department which experiences particularly high levels of deforestation where 6,883km^2 of forest was cleared between 2000-2020, equivalent to 8.5% of the region's total forest-covered land.

The team's findings include:

- Even the small, remnant forests found on the farms studied were host to unique communities of invertebrates and plants, evidence that preserving these should be a priority in terms of biodiversity.
- Silvopasture supports greater numbers of native plant species (72 species) compared to traditional pastures (62).
- Fewer herbivorous pests are found in silvopasture compared with traditional pastures. On average, across the farms surveyed, almost twice as many (a 95% increase) of insects (called Hemipterans) were found in traditional pasture compared to silvopasture. This may indicate that greater biological control by invertebrate predators such as spiders occurs in silvopasture,

although further data is needed to confirm this hypothesis.

- Twenty-five percent of trees planted to establish the silvopasture were from the legume family (Fabaceae) which have the potential to increase soil fertility by fixing nitrogen from the air to the soil, and may therefore help increase the productivity of livestock.
- The use of improved forage grasses, such as Brachiaria, may contribute to increased productivity in silvopasture compared to traditional pastures, as we found the average height of the grazing grasses in silvopasture was more than double that in traditional pasture.
- Silvopasture can sequester more carbon than traditional pasture, and allows higher stocking densities (between 1.25 and 3.75 times higher than conventional pasture), resulting in an average 1.8 times less GHG emissions. However, primary forest plots are still 66.5 times more effective at storing carbon than silvopasture and it is therefore vital to halt further deforestation. Regenerated forests sequestered between 27 to 164 times more CO_2 per hectare per year than SPS.

Dr. Maria Paula Escobar, a human geographer who works as a Lecturer in Environmental Geography at the Bristol Veterinary School, and BioSmart project lead, said: "Our work shows that the adoption of silvopastoral farming could avoid further decimation of Colombia's forests. We show if 75% of suitable existing pastureland in Caquetá was converted to SPS pastures, this would save up to 7% of Colombia's emissions budget for 2030, which would contribute to the Colombian government's pathway to net zero. But this can only happen if funders and implementers understand that deforestation is not only the result of individual agricultural practices, but the result of complex historical, socioeconomic and political problems.

"Deforested areas have a high potential to transition from intensive

farming to more sustainable practices, including silvopasture. Since many of these areas are next to forest remnants in Caquetá, adopting more sustainable agriculture, coupled with farmers' agreements to protect remaining forests would prevent further conversion of primary forest and slow overall deforestation rates. While sustainable agriculture alone is insufficient to reduce deforestation, silvopasture could play a significant role in helping to achieve Colombia's greenhouse gas emissions reduction targets for 2030, but projects that aim to implement them must build trust and avoid perpetuating inequalities."

More information: Report: cgspace.cgiar.org/handle/10568/116100

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