Ecuador: Deforestation destroys more dry forest than climate change

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Most of Ecuador's dry forests are located in the southwest of the country, in the Tumbes-Chocó-Magdalena region. Credit: P. Hildebrandt/ TUM

Tropical forests all over the world are at risk from climate change and deforestation for arable land. Scientists from the Technical University of Munich (TUM) and the Thünen-Institute compared losses due to

deforestation with those that would result in extreme climate change scenarios in Ecuador. Although global warming is likely to change the distribution of species, deforestation will result in the loss of more dry forests than predicted by climate change damage.

A large proportion of Ecuador's rare dry forests are located in the southwest of the country, in the Tumbes-Chocó-Magdalena region. These forests provide important ecosystem services that regulate the water balance and protect the soil from erosion. However, the area suffers a high loss of habitat due to deforestation for more arable and pasture land. This exacerbates the negative effects of climate change, such as temperature increases.

In cooperation with scientists from the Thünen-Institut and the Ecuadorian Universidad Técnica Particular de Loja, a team from TUM compared the predicted loss area of tree species caused by deforestation and that by predicted forest losses in an extreme climate change scenario. We have evaluated 660 data sets on the occurrence of 17 characteristic species of dry forests in the south of Ecuador. In order to estimate both potential threats, we have compared the forecast annual rates of losses. However, the results are not transferable to other tree species in other regions." says co-author Carlos Manchego.

Losses from conversions in the period 2008 to 2014, especially for agricultural and pasture land, averaged 71 square kilometres per year for all species in the study area. The predicted loss of species area in the climate change scenario was only 21 square kilometres per year.

Recommendations for more effective forest protection and sustainable land use

One unexpected outcome was the displacement directions of tree species

due to climate change. While some species migrate to the north, other species find their future distribution focus more to the south. This leads to a trend towards mixing tree species with hitherto unknown effects on the functionality and stability of future forest communities," says Hildebrandt. "At the same time, grubbing-up starts in the higher altitudes, because it's easier to grow something like corn there."

According to Hildebrandt, it is important for efficient planning, the implementation of protective measures and sustainable land use to prioritise the measures according to such threats and weak points. A distinction must be made between the potential threats posed by climate change and deforestation. With the study, we wanted to provide a scientific frame of reference to identify the lesser evil and make targeted recommendations".

However, regardless of the conservation strategy, these objectives required the participation of both private landowners and local communities.

More information: Carlos E. Manchego et al, Climate change versus deforestation: Implications for tree species distribution in the dry forests of southern Ecuador, *PLOS ONE* (2017). DOI: 10.1371/journal.pone.0190092

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