

News Release

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Forest and climate protection zones in the tropics TUM researchers develop a land utilization concept to protect rain forests

“Protect the rain forest” – easily said from the midst of Europe. But when all is said and done, local land users have to live off of something. Traditionally, farmers clear rain forests piece by piece to utilize the resulting grazing land until the earth is depleted. This vicious cycle is bad for both the environment and the farmers, who are dependent on the price of milk and cattle. Using an extensive computer simulation and common business sense, forest scientists at the Technische Universität München (TUM) have now found a solution to this old problem that is beneficial to all those involved.

To date, ecological services in ecosystems, e.g. the preservation of water quality, the conservation of biodiversity and the storage of the greenhouse gas carbon dioxide have hardly played a role in economic decision making. For a number of years, however, there have been extensive efforts to put a financial price tag on these kinds of services, allowing them to be factored into economic planning. On a global scale this idea is finding application as a result of the Kyoto Protocol: it already includes provisions for tropical countries to be rewarded in dollars and cents when they bind the climate killer CO₂ through reforestation. The next commitment phase has provisions for providing financial incentives to countries that refrain from clear cutting to reduce CO₂ emissions.

Around the globe, therefore, expectations of environmental advocates hoping to save tropical forests rest on the hope that ecological services provided by forests will be remunerated with transfer payments from the industrialized world – allowing deforestation to be curbed. However, this wonderful idea has one snag: farmers will not sit back to watch the trees grow just because of the payments. In fact, they need intelligent land use concepts that will allow them to earn a sustainable living, without destroying the forests. A group of TUM forest researchers has developed just such a concept.

The researchers investigated land utilization in the mountainous rain forests of southern Ecuador. Over the past eight years they have cultivated and analyzed 30 hectares of test plots. In addition, they have developed a bio-economic model that can be used to optimize

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local land utilization on a farm level. This is urgently needed because every day natural forests are clear-cut to serve as grazing land. Once the earth is depleted landowners simply move on to the next piece of forest. The idea of the TUM team: Farmers who use their farmland in diversified ways help not only the mountain rain forest. They also distribute the mainstay of their income among several pillars, instead of building exclusively on cattle farming.

This provides the farmers with financial security – an excellent incentive for adopting the researchers' optimization model. But first the researchers had to meticulously observe and analyze the situation. In addition to traditional pasture farming they also considered conservative logging in natural forests, as well as the reforestation of abandoned grazing lands with the indigenous Andes alder. This tree species grows very well in the region and at the same time improves the depleted earth with its excellent nitrogen-binding ability. The computer model at the same time calculated the loss risk for various utilization alternatives, e.g. through climate-related crop failure or market price fluctuations for produced products.

The result is crystal clear: the key to success lies in diversifying production with a mix of pasture farming and reforestation of abandoned grazing land with Andes alders, supplemented by friendly utilization of natural forests. This silver bullet leads to sustainable land management that makes economic sense. In the farm model, fed with real-world data, tropical forest eradication could be stopped after a ten-year transition period. Farmers' incomes rose by 65% during the same period – along with a reduced risk of financial loss.

The only prerequisite for the economic viability of this concept is that the interest rate for financing the initial reforestation may not exceed six percent. "Here the climate protection deal with industrialized countries comes into play again. The expected transfer payments for eco-services are high enough to ensure this low interest rate," Prof Weber from the Chair for Forestry is convinced. "Follow-up reforestation projects can be financed from the first lumber returns. Tropical farmers can manage that of their own accord."

The new land utilization concept of the TUM researchers is a boon to everyone. It improves the income security of Ecuadoran farmers while at the same time leading to sustainable land use. That is for the good of all: because tropical rain forest conservation will help mitigate climate change.

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Literature:

Thomas Knoke, Baltazar Calvas, Nikolay Aguirre, Rosa María Román-Cuesta, Sven Günter, Bernd Stimm, Michael Weber, Reinhard Mosandl (2009): Can tropical farmers reconcile subsistence needs with forest conservation? *Frontiers in Ecology and the Environment*. Available online at <http://www.esajournals.org/doi/abs/10.1890/080131>

Technische Universität München (TUM) is one of Europe’s leading universities. It has roughly 420 professors, 6,500 academic and non-academic staff (including those at the university hospital “Rechts der Isar”), and 23,000 students. It focuses on the engineering sciences, natural sciences, life sciences, medicine, and economic sciences. After winning numerous awards, it was selected as an “Elite University” in 2006 by the Science Council (Wissenschaftsrat) and the German Research Foundation (DFG). The university’s global network includes an outpost in Singapore. TUM is dedicated to the ideal of a top-level research based entrepreneurial university.

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