

Study on climate protection: More forest, less meat

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Increasing forest areas can decisively contribute to reaching the Paris climate goal—but it competes with agriculture for land. Credit: Sam Rabin, KIT

Forest protects the climate. Reforestation can decisively contribute to mitigating global warming according to the Paris Agreement. Based on simulations, researchers of Karlsruhe Institute of Technology (KIT) have studied the conditions that should be fulfilled in Europe for this.

According to the study published in *Environmental Research Letters*, sufficient increase in forest areas requires a transformation of the food system and in particular, the reduction of meat consumption.

According to the Paris Agreement, global temperature increase must be limited to well below 2°C, if possible, to 1.5°C. Land-based [mitigation measures](#), especially afforestation, reforestation, and avoided deforestation, can help reach this goal. Trees absorb CO₂ greenhouse gas from the atmosphere to produce biomass and, thus, fight against [global warming](#). The expansion of forests, however, competes with land for agriculture not only regionally, but also globally. The more so as global population growth and change of dietary habits will cause the worldwide demand for [food](#) and in particular for meat to increase.

With the help of model simulations, researchers of the Atmospheric Environmental Research Division of KIT's Institute of Meteorology and Climate Research (IMK-IFU), i.e. KIT's Campus Alpine in Garmisch-Partenkirchen, the University of Edinburgh, Cranfield University / UK, and the TIAMASG Foundation in Bucharest recently studied the conditions under which forests in Europe can bind sufficient carbon.

For their study published in *Environmental Research Letters*, the scientists used an integrated model developed within the EU project IMPRESSIONS (Impacts and risks from high-end scenarios: strategies for innovative solutions). By using this interactive, web-based platform, impacts of climate change, damage potentials, and adaptation strategies can be investigated. The so-called integrated assessment platform (IAP) comprises interconnected meta-models for urban development, water resources, floods, [forest](#), and agriculture, as well as biodiversity and

visualizes relationships between climatic and socioeconomic factors.

"We compared various scenarios with variable demands for meat, cultivations of energy plants, irrigation efficiencies, and harvest yield increases," says Dr. Heera Lee of IMK-IFU, the first author of the study. Of a total of 972 simulations for the 2050s, 351 reach the minimum values for both forest area and food supply targets. This means that the forest area must expand by at least 23 percent compared to 2010 to reach the Paris climate goal and a food energy supply of at least 2800 kcal per person and day.

Of these successful simulations, 42 do not require any change of dietary habits, but an increase in harvest yield by at least 30 percent in Europe. Six simulations require replacement of ruminant meat by other meat, 215 require reduced meat consumption by 25 to 75 percent, 88 no meat consumption at all, with the harvest yields having to be increased by at least 15 percent in both cases. "Our study reveals that sufficient expansion of [forest areas](#) for climate protection and secure food supply require a transformation of the food system on both the supply and the demand side, with partial or total [meat](#) avoidance certainly being a great challenge in practice," Dr. Heera Lee says. "It is important not to increase food imports to Europe in order to prevent a shift of food production and deforestation in other regions of the world."

More information: Heera Lee et al. Implementing land-based mitigation to achieve the Paris Agreement in Europe requires food system transformation, *Environmental Research Letters* (2019). [DOI: 10.1088/1748-9326/ab3744](https://doi.org/10.1088/1748-9326/ab3744)

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