

How climate-friendly is your cup of coffee?

July 3 2013

Coffee drinkers are encouraged to buy environmentally-friendly coffee, whether it be certified, organic or shade coffee (grown under the shade of trees that are important habitat for birds), but how effective are these ways of growing coffee at combating climate change?

Researchers at Bangor University, Wales, the Tropical Agricultural Research and Higher Education Centre, Costa Rica (CATIE) and the Natural Resources Institute of the University of Greenwich, have recently published findings that may go some way to answering this question in the scientific journals [*Agricultural Systems*](#) and [*Agriculture Ecosystems and Environment*](#).

The results of these studies suggest that reducing [carbon](#) emissions through [agricultural intensification](#) can help coffee farms combat climate change. Carefully intensifying the productivity of existing coffee farms, as an alternative to extending [coffee production](#) onto existing forest land, could reduce carbon emissions that cause climate change.

Their study was based on coffee farms and long-term field experiments in Costa Rica and Nicaragua and investigated whether it would make more financial and climate sense for farmers to switch from one type of farm management to another. For example, from a less intensive to a more intensive system, or from conventional to organic farming.

Dr Martin Noponen, a joint Bangor University-CATIE PhD student and lead author of both studies, said: "Our results suggest that in agricultural production systems with shade trees, such as for coffee, the increase in

[greenhouse gas emissions](#) from intensification of production can be compensated for, or in some cases even outweighed, by the increase in uptake of [atmospheric carbon dioxide](#) into above-ground and below-ground tree biomass".

"Although growing coffee under shade was not found to improve soil [carbon stocks](#) over the first ten years, we know that shaded coffee farms (those with trees planted amongst the coffee bushes) store much more carbon in tree biomass than unshaded full-sun coffee systems. At the same time, however, full-sun farms can be more profitable through higher coffee yields thus creating an economic incentive for farmers to convert shaded to full-sun coffee."

The study found that compensating farmers for not converting to more profitable (but less environmentally-friendly) unshaded coffee would cost from 9.3 to 196.3 US\$ per tonne of carbon emissions avoided, depending on the type of shaded system – a value range that is for the most part very expensive and far above current international carbon market prices.

John Healey, Professor of Forest Sciences at Bangor University, who led the research team, said: "It's important to remember that, although shaded [coffee farms](#) might store more carbon and therefore be good for the climate in one sense, if the coffee yield is lower, then coffee farmers collectively may choose to farm a larger area of land in order to maintain their income. This could mean that some encroach onto forested areas with negative impacts on climate, biodiversity and other services provided by forest ecosystems."

"On the other hand, if production could be intensified on shaded farms, coffee farming could help to reduce climate change by storing more atmospheric carbon dioxide in above-ground biomass, while at the same time reducing pressure for further forest conversion to agriculture."

Dr Jeremy Haggar, Head of Agriculture, Health and Environment at the University of Greenwich, said: "Although there are short-term economic advantages to growing full-sun coffee, farmers in Central America have been reverting to shaded systems as they are cheaper to maintain when coffee prices fall." "Within shaded production there is a broad range in the intensity of production, and thus potential to manage those systems with higher coffee productivity and storage of carbon in trees. Overall this would minimize the carbon footprint and reduce the need to expand the area under [coffee](#). Nevertheless identifying those management options will depend on specialised technical support to farmers and incentives to make that investment."

Provided by Bangor University

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