Protecting wild species may require growing more food on less land: study

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In parts of the world still rich in biodiversity, separating natural habitats from high-yielding farmland could be a more effective way to conserve wild species than trying to grow crops and conserve nature on the same land, according to a new study published today in the journal *Science*.

The study, by researchers at the University of Cambridge and the Royal Society for the Protection of Birds, collected information on more than 600 species in southwest Ghana and northern India, two parts of the world where demand for agricultural land is putting ever more pressure on wild species. The researchers measured crop production as well as the abundances of birds and trees in forests and in various types of farmland.

"Farmland with some retained natural vegetation had more species of birds and trees than high-yielding monocultures of oil palm, rice or wheat but produced far less food energy and profit per hectare," said lead author Dr Ben Phalan from the University of Cambridge. "As well as requiring more land to produce the same amount of food, the 'wildlife-friendly' farmlands were not as wildlife-friendly as they first appeared. Compared with forest, they failed to provide good habitat for the majority of bird and tree species in either region."

The researchers discovered that, under current and future scenarios of food demand, most species would have larger total populations if farming was restricted to the smallest area feasible, while protecting as much natural forest as possible. This was true not just for rare species

but for common species as well.

This strategy, called 'land sparing', uses higher yields on existing farmland to spare land for nature (in contrast with 'land sharing', which aims to conserve wild species and grow crops on the same land). Because high-yield farming produced more food from less land, it could be used as part of a strategy to protect larger tracts of natural habitats such as forest.

"It would be nice to think that we could conserve species and produce lots of food, all on the same land," said study author, Dr Malvika Onial from the University of Cambridge. "But our data from Ghana and India show that's not the best option for most species. To produce a given amount of food, it would be better for biodiversity to farm as productively as possible, if that allows more natural habitat to be protected or restored."

"It is critical to note that increasing crop yields would not work in isolation," said study author Professor Andrew Balmford from the University of Cambridge. "Such increases need to be combined with active measures such as national parks and community reserves to protect natural habitats from conversion to farmland. Conservation policy-makers should explore new ways to link protection of natural habitats with efforts to increase food yield per unit area in sustainable ways. Food retailers could perhaps make these linkages a feature of environmentally-friendly food products."

The researchers cautioned, however, that although their findings in Ghana and India are remarkably consistent, they may not hold true everywhere. It is possible that land sparing will be a better strategy in some places and land sharing in others. They advise that further studies in representative parts of the world are needed to determine whether there is a more general pattern.

"Our study does not give uncritical support to large-scale agribusiness over small-scale farming systems," said study author Professor Rhys Green from the Royal Society for the Protection of Birds and the University of Cambridge. "High-yielding organic farming and other systems such as agroforestry can be a useful component of a land sparing strategy and may offer the additional advantage of fewer adverse effects of farming from fertilisers and pesticides. But whatever the farming system, protection of natural habitats will continue to be essential for the conservation of many species."

More information: The paper 'Reconciling food production and biodiversity conservation: land sharing and land sparing compared' will be published in the 02 September 2011 edition of *Science*.

Provided by University of Cambridge