

different parts of the turbine's blades in unpredictable and confusing ways. The clutter this causes on the screen is made worse when the signal is bounced around between different turbines in the same farm. The result is that wind farms can be impossible to filter out because the resolution of a typical long-range radar is not high enough to detect the difference between the Doppler effect caused by an aircraft and that caused by a wind turbine.

Holographic-infill radar would deal with this by creating a "patch" covering each farm that could be applied to the wider air-traffic control radar image. The patch would be created by bathing the farm in a continuous stream of radar pulses at short range, rather than sweeping a beam over it from a distance. The reflections of these pulses, when fed into a computer, would provide what was, in effect, a moving radar picture of the farm. If an alien object, such as an aircraft, intruded into this picture, it would be easy to spot.

Cambridge Consultants has already tested a small-scale version at the site of a single wind turbine. It was able to show a different Doppler effect for a target moving on the ground from the one produced by the turbine's blades, according to Craig Webster, who is in charge of clean technologies at the company. The next step is to see if this can be repeated over a wider area and with a flying object; in this case a radio-controlled model helicopter.

Eventually, Cambridge Consultants hopes to build a full-sized demonstration system at a wind farm. If that works, it would mean that potential blind spots in the radar network could be illuminated, clearing the way for more investment in green electricity. ■

Biodiversity

Forest-friendly farming

"Betel nuts" show one way to mix crops and conservation

FARMING and wildlife are not easy bedfellows. All around the world, species are vanishing as their habitat is turned over to crops. Such land conversion is particularly severe in the tropics, where most of the world's species live. And though nature reserves offer some respite, they are unlikely to be enough on their own. What would help would be to encourage forms of farming that are in harmony with the conservation of biodiversity.

Jai Ranganathan, of Stanford University, and his colleagues think they have found one. As they report in the *Proceedings of the National Academy of Sciences*,

Pest control

United we fall

Surprisingly, two pests together may do less damage than one by itself

IF AN introduced pest gets going in a new habitat, a common response is to find a predator that likes to eat it and release that, too. But a discovery just published in *Ecology*, by Evan Preisser of the University of Rhode Island and Joseph Elkinton of the University of Massachusetts at Amherst, suggests an alternative approach that might be viable: introduce another pest that will compete with the first one.

Dr Preisser and Dr Elkinton experimented with two Asian sap-sucking insects, the hemlock woolly adelgid and the elongate hemlock scale-insect, that have plagued the hemlock forests of North America over the past century. The researchers infested groups of hemlock trees (which are unrelated to the poisonous herb) with one or other parasite, with both, or with none, and found that the woolly adelgid causes much more dam-

age than the scale-insect. The former restricted the growth of the trees' branches by a third over the course of two and a half years, compared with uninfested trees. The latter, by less than a twentieth. What was curious, though, was that the growth-restriction of trees infested by both species was only twice that of those that had the scale-insect alone—in other words, less than a tenth.

The authors suggest this is the result of competition between the two pest species. Although both feed by draining the hemlocks of their juices, the adelgids also inject toxic chemicals into the trees. The presence of scales kept the adelgid's numbers down, which led to less toxin and healthier hemlocks. The conclusion, therefore, is that although it is best to have no pests at all, there are at least some circumstances when two invasives are better than one.

they conducted a survey in the Western Ghats, a mountain range in south-west India. This region has been cultivated for over 2,000 years but remains a hotspot for biodiversity. They looked at birds in different areas of vegetation, including intact forest, plantations and shrub land.

The bird species of greatest concern, such as the Great Hornbill, are found in or near forests. No surprise there. The surprising finding was that local plantations of areca palms retained 90% of the birds associated with native forest.

The fruit of this palm is sometimes used in medicines but is mostly chewed along with betel leaves as a mild, coffee-like stimulant—resulting in a brilliant red stain on people's teeth. This practice is widespread in India and its neighbours, in Taiwan, and in parts of South-East Asia and Melanesia.

Because the fruits (widely, but incorrectly, referred to as "betel nuts") come from tall stands of lush trees, farming them provides habitat for the forest birds in the region. In addition, areca-palm plantations are usually intercropped with species such as vanilla, pepper, bananas and coconuts. All this makes those plantations structurally complex. And structural complexity is something that makes forests hospitable to lots of species. The plantations also rely on mulches made from leaf litter deposited in nearby forests. This form of agriculture therefore depends on having reasonably intact local forests to provide the mulch. That, too, is biodiversity-friendly.

This is not, of course, to argue that the whole of southern Asia's farmland should

be turned over to areca palms. But there may be some wider lessons to be learnt. The multiple crops grown in areca plantations make them profitable operations, so there could be economic as well as environmental benefits to trying to extend the idea to other types of farming. Unfortunately, that would be hard in the case of the area's main crop, rice. A pity. But you have to start somewhere. ■



Nuts to conservation