

# Study predicts when invasive species can travel more readily by air

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Global airlines be forewarned: June 2010 could be a busy month for invasive plants, insects and animals seeking free rides to distant lands.

A new study forecasts when climate factors such as temperature, humidity and rainfall will match at geographically distant airline departure and destination points, which could help to shuffle invasive species, and the diseases they may carry, across the globe along existing flight routes. The findings provide a framework that could help people who monitor airline flights — and the people, baggage and cargo aboard — to plan more efficiently and accurately for detecting and intercepting invasives.

Andy Tatem, who holds a joint position at the Emerging Pathogens Institute and the University of Florida's geography department, said his model uses the latest forecast data for climate change and air traffic volumes.

"The problem is that as the global transport networks expand, we're getting more and more invasive species and pathogens coming from different parts of the world that have survived isolated for thousands of years," said Tatem, who joined UF in January. "But now they have this high-speed link going between different regions of the world."

The study was published online Jan. 22 in the journal *Ecography*, and the work was performed in his previous position at the University of Oxford.

Tatem predicts a peak risk will be reached in June 2010, when multiple factors converge to create a month when the climate factors at many flight origin and destination airports would be most similar.

"The model shows us that climatic shifts are not greatly significant over the next few years," Tatem said. "But the great increase in traffic volumes from expanding economies in India and China are likely to have a significant effect on moving species. This gives us much more of a detailed idea on the importance of key risk factors and how these change over time, compared to previous work we did in 2007."

Tatem reached his conclusions by comparing fine-scale global climate models for 2009 and 2010 prepared by the Hadley Centre for Climate Prediction and Research with models forecasting traffic volumes on existing airline networks, prepared by OAG Worldwide. The airline models include more than 35 million scheduled flights between 3,570 airports on more than 44,000 different routes.

But exactly how native species wind up aboard an outbound passenger or freight aircraft is still being studied. Tatem said it can be a combination of goods, transport and people bringing things aboard either accidentally or knowingly.

"Some studies have shown that mosquitoes can fly on randomly, or they may get into baggage," he said. "But some things, like plant pathogens, happen when people purposely bring fruit aboard, or they may bring in a plant that makes it through inspections, or they may just have seeds stuck in the soles of their shoes."

These activities compound over the entire global system, threatening local economies, public health and native ecosystems. In 2007, a biological invasion was documented from a single invasive insect in a study conducted by York University biologists Amro Zayed and

Laurence Packer. A different 2007 study by Andrew Liebhold, published in *American Entomologist*, examined records of U.S. Department of Agricultural inspectors encountering invasive species in airline baggage. Liebhold, a research entomologist with the Northeastern Research Station of the U.S. Forest Service, reported that infested fruit, mainly from the tropics, was the most commonly intercepted commodity, and that flies, cicadas, planthoppers, aphids and scale insects were the most commonly intercepted invasive insects.

Liebhold said Tatem's study provided fascinating predictions about expected trends in the accidental transport of invasive species among continents.

"Unfortunately, unwitting air passengers have too frequently provided transport of plant pests and human diseases and this trend has increased with elevated intercontinental passenger traffic," Liebhold said.

"Hopefully, government agencies will pay attention to these results and utilize them to strengthen inspection activities at airports in order to protect the world from the devastating impacts of alien species on natural ecosystems as well as on human health."

Source: University of Florida

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