Tim Sullivan

From: Knutson, Lingard
Sent: Tuesday, August 12, 2014 8:47 AM
To: Tim Sullivan; Jacobson, Roy (DEC)
Cc: Musumeci, Grace; Lamster, Stephanie
Subject: Even more reasons against forest fragmentation

Study reveals effect of habitat fragmentation on forest carbon cycle

13 hours ago

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Biogradska forest in Montenegro. Credit: Wikipedia.

Drier conditions at the edges of forest patches slow down the decay of dead wood and significantly alter the cycling of carbon and nutrients in woodland ecosystems, according to a new study.

Forests around the world have become increasingly fragmented, and in the UK three quarters of woodland area lie within 100 metres of the forest edge. It has long been known that so-called 'edge effects' influence temperature and moisture (the 'microclimate') in woodlands, but the influence on the carbon cycle is largely unknown.

Researchers from the University of Exeter and Earthwatch in the UK combined experiments with mathematical modelling to fill this knowledge gap. Wood blocks were placed in Wytham Woods near Oxford at various distances from the forest edge, and left to decay over two years. The measured decay rates were applied to a

model of the surrounding landscape, to allow comparison between the current fragmented woodland cover and decay rates in continuous forest.

The research, published today in the journal Global Change Biology, shows that wood decay rates in the southern UK are reduced by around one quarter due to fragmentation. This effect is much larger than expected due to variation in temperatures and rainfall among years.

Dr Dan Bebber of the University of Exeter said: "We were surprised by the strength of the edge effect on wood decay, which we believe was driven by reduced moisture at the forest edge impairing the activity of saprotrophic fungi – those that live and feed on dead organic matter".

Wood decay, and the recycling of other biological matter like leaf litter, is driven by fungi and other microbes that are sensitive to temperature and moisture. The difference between the absorption of carbon dioxide via photosynthesis by trees, and the release of carbon by microbes, determines the overall carbon balance of the forest.

Dr Martha Crockatt of Earthwatch said: "Saprotrophic fungi control the cycling of carbon and nutrients from wood in forests, and their responses to changes in microclimate driven by fragmentation, and also climate change, will influence whether forests are a carbon source or sink".

The southern UK has a temperate climate with moderate temperatures and rainfall. Similar studies in different parts of the world, from the warm tropics to the cooler boreal regions, are needed to understand how edge effects on decomposition vary globally.

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More information: "Edge effects on moisture reduce wood decomposition rate in a temperate forest" by M. E. Crockatt & D. P. Bebber, is published in *Global Change Biology*.

Journal reference: Global Change Biology

Provided by University of Exeter

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