What climate change means for leaf litter

March 30 2017, by Evelyn S. Gonzalez

Credit: Florida International University

The carbon dioxide coming from some of Earth's tiniest residents may not be increasing as quickly as some believed in the face of global climate change.

Streams and rivers are home to insects, bacteria and fungi that consume

plant litter, including fallen leaves, and break it into smaller pieces. This type of litter is good for streams and rivers because it helps remove toxins. As leaf litter is consumed, insects and microbes get oxygen, convert nutrients into energy and release carbon dioxide into the atmosphere. This process is what scientists call leaf litter decay.

According to a recently released study, temperature is not the only factor in how quickly insects and micro-organisms convert their food into energy and, as a byproduct, release carbon dioxide into the air. This finding contradicts a long-held belief that this process would accelerate with rising temperatures. Understanding how plant matter breaks down in different environments can help scientists predict how ecosystems will respond to climate change.

"If you have a reliable source of energy for organisms in an ecosystem, like the energy provided by consuming leaf litter, the communities of animals and plants living there will be more persistent," said John Kominoski, a Florida International University biologist and co-author of the study. "Since global temperatures are rising and leaf litter decay is not as sensitive to temperature as once believed, it gives us hope ecosystems won't be as energy-limited as we had thought."

The international research team found the rates of leaf litter decay in streams and rivers may increase 5 to 21 percent if global water temperatures rise 1 degree Fahrenheit to 5 degrees Fahrenheit. This is half as much as the 10 to 45 percent increase previously predicted by scientists. Instead, the researchers found differences in leaf chemistry and differences in consumption activities influence leaf litter decay beyond temperature alone.

Kominoski said commercial fisheries and even recreational ones like those in the Florida Everglades and Florida Bay depend on leaf litter and other organic matter to maintain healthy marine life and ecosystems. In

the case of leaf litter decay, it is not as obvious as melting of ice caps, but the researchers point out the process is an important indicator of the health of streams and rivers.

Led by the University of Utah, the study was published in *Global Change Biology*.

More information: Jennifer J. Follstad Shah et al. Global synthesis of the temperature sensitivity of leaf litter breakdown in streams and rivers, *Global Change Biology* (2017). DOI: 10.1111/gcb.13609

Provided by Florida International University

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