

Riparian buffers act as microclimatic refugia in oil palm landscapes

ABSTRACT

There is growing interest in the ecological value of set-aside habitats around rivers in tropical agriculture. These riparian buffers typically comprise forest or other non-production habitat, and are established to maintain water quality and hydrological processes, while also supporting biodiversity, ecosystem function and landscape connectivity. We investigated the capacity for riparian buffers to act as microclimatic refugia by combining field-based measurements of temperature, humidity and dung beetle communities with remotely sensed data from LiDAR across an oil palm dominated landscape in Borneo. Riparian buffers offer a cool and humid habitat relative to surrounding oil palm plantations, with wider buffers characterised by conditions comparable to riparian sites in continuous logged forest. High vegetation quality and topographic sheltering were strongly associated with cooler and more humid microclimates in riparian habitats across the landscape. Variance in beetle diversity was also predicted by both proximity-to-edge and microclimatic conditions within the buffer, suggesting that narrow buffers amplify the negative impacts that high temperatures have on biodiversity. Synthesis and applications. Widely legislated riparian buffer widths of 20–30 m each side of a river may provide drier and less humid microclimatic conditions than continuous forest. Adopting wider buffers and maintaining high vegetation quality will ensure set-asides established for hydrological reasons bring co-benefits for terrestrial biodiversity, both now, and in the face of anthropogenic climate change.