

Mixing tree species is especially beneficial for biodiversity and forest functioning in highly fragmented landscapes

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Abstract

Contemporary forest management strives to satisfy contrasting demands on forest ecosystems by promoting multiple ecosystem services. These services are affected in varied manners by alternative management actions operating at local or landscape scales, potentially leading to trade-offs and synergies. We here studied ecosystem functions and biodiversity data across ecosystem compartments in 53 mature forest plots varying in stand-level (tree species composition) and landscape-level (degree of fragmentation) characteristics. We show that more than two-thirds of the 20 trade-offs and synergies between functions and diversity variables were driven by variation in tree species composition and fragmentation. Interestingly, more fragmented landscapes had higher landscape-level forest functioning, but this came at the expense of forest biodiversity. At the same time, mixed forest stands had higher levels of biodiversity than monocultures without affecting forest functioning. Diversifying forest stands thus represents a potential management strategy that promotes both ecosystems functioning and biodiversity in fragmented landscapes.

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