Seeing the forest for the trees

Ecologists are embracing the use of forestry data, offering the chance to move beyond decades of division between disciplines.

This issue includes two studies that explore the important, but sometimes neglected, role of mycorrhizae in determining the macroscale structure of forests. Both make use of data from the US Forest Service Forest Inventory Analysis. Averill et al. test the idea that the two common types of symbiotic fungal network of trees, arbuscular mycorrhizae and ectomycorrhizae, each generate positive feedbacks that favour their own network over the other. This means that forests with both types of network are rare, and instead forests dominated by one or the other constitute two alternative stable states. Meanwhile, Carteron et al. investigate how the two types of fungal network affect tree diversity. It has been suggested that ectomycorrhizae drive positive plant–soil feedbacks that result in low tree diversity, whereas arbuscular mycorrhizae support high diversity because of negative feedbacks. However, the authors found that forests dominated by either type have relatively low tree diversity, and that high diversity is found where both types of network are present.

As well as providing welcome insight into the influences of mycorrhizal networks, these two studies also illustrate the use of forest inventory data by ecologists. Foresters and (forest) ecologists have a lot to offer each other. For ecologists, a big part of the benefit is access to data. Managed forests have been monitored by foresters for centuries, with a strong commercial incentive to record data at a scale that often cannot be matched by purely scientific funding. In addition to the studies in this issue, forestry databases have been used to test several core ecological questions such as biogeochmical niche theory (Nat. Eco. Evo. 5, 184–194; 2021), coexistence theory (Nat. Eco. Evo. 5, 965–973; 2021) and patterns of dominance (Nat. Eco. Evo. 5, 757–767; 2021). Forestry data are a treasure trove that offers high spatial and temporal coverage, both of which are extremely useful for studying mortality and other responses to global change.

That said, there is still a need for caution. In many cases — including in the US Forest Inventory Analysis programme — the monitored plots are located on land that is harvested for commercial use and/or thinned as a part of management programmes. Such management could alter interpretation of ecological results based on these data. Further, national forest inventories typically monitor only a few variables — tree growth and mortality — and are not designed to consider the other flora, fauna and environmental characteristics of forests, thus neglecting important interactions. In this regard, some may argue that plots deliberately established by ecologists, in areas that are not logged, should remain the gold standard for basic forest ecology research. Such plots are more sparsely distributed than forest inventories, but efforts have been made to unify them into formal research networks, such as ForestGEO (https://forestgeo.si.edu/) and TreeDivNet (https://treedivnet.ugent.be/index.html; Nat. Eco. Evo. 2, 763–766; 2018). In particular, TreeDivNet’s mission appears to be aimed at reconciling past disconnects between ecologists and foresters by designing ecology experiments that meet the criteria to be considered by forest managers.

Whenever one discipline pulls another discipline’s data or tools off the shelf, there are risks of unintended consequences. In the case of using forest inventory data, ecologists would benefit from involving representatives of government agencies in the research to ensure that any complexities in the datasets are correctly dealt with. Closer collaboration might in turn improve the two-way interaction between the disciplines, with foresters encouraged to consider the most recent developments in ecological theory and data.

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