

Tropical and subtropical Asia's valued tree species under threat

ABSTRACT

Tree diversity in Asia's tropical and subtropical forests is central to nature-based solutions. Species vulnerability to multiple threats, which affect provision of ecosystem services, is poorly understood. We conducted a region-wide, spatially explicit assessment of the vulnerability of 63 socioeconomically important tree species to overexploitation, fire, overgrazing, habitat conversion, and climate change. Trees were selected for assessment from national priority lists, and selections were validated by an expert network representing 20 countries. We used Maxent suitability modeling to predict species distribution ranges, freely accessible spatial data sets to map threat exposures, and functional traits to estimate threat sensitivities. Species-specific vulnerability maps were created as the product of exposure maps and sensitivity estimates. Based on vulnerability to current threats and climate change, we identified priority areas for conservation and restoration. Overall, 74% of the most important areas for conservation of these trees fell outside protected areas, and all species were severely threatened across an average of 47% of their native ranges. The most imminent threats were overexploitation and habitat conversion; populations were severely threatened by these factors in an average of 24% and 16% of their ranges, respectively. Our model predicted limited overall climate change impacts, although some study species were likely to lose over 15% of their habitat by 2050 due to climate change. We pinpointed specific natural areas in Borneo rain forests as hotspots for in situ conservation of forest genetic resources, more than 82% of which fell outside designated protected areas. We also identified degraded areas in Western Ghats, Indochina dry forests, and Sumatran rain forests as hotspots for restoration, where planting or assisted natural regeneration will help conserve these species, and croplands in southern India and Thailand as potentially important agroforestry options. Our results highlight the need for regionally coordinated action for effective conservation and restoration.