Supporting Information

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SI Materials and Methods

We collated all published national-level floristic checklists for Amazonian countries, including Brazil, Colombia, Ecuador, Peru, Venezuela, and Bolivia (26–33), and the checklist for the Guiana Shield (Venezuela, Surinam, Guyana, and French Guiana; refs. 34–36). These checklists represent the ongoing work of hundreds of taxonomists worldwide, aiming to accurately describe and characterize the seed plant flora. The data are derived from voucher specimens annotated by taxonomic specialists, taking into account the most current synonymy available. The largest part of the Amazonian flora, Brazil's online checklist and ongoing flora project (www.floradobrasil.jbrj.gov.br), was followed for synonymy in cases of disagreement between floristic works. New species of seed plants published since the publication of the reviewed checklists were added (73, 75). Subspecies, varieties, hybrids, and nonnative species were not counted. For 66 families—Achariaceae, Anacardiaceae, Annonaceae, Apocynaceae, Araceae, Araliaceae, Asteraceae, Begoniaceae, Bignoniaceae, Boraginaceae, Bromeliaceae, Burseraceae, Calophyllaceae, Cannabaceae, Caricaceae, Caryocaraceae, Chloranthaceae, Chrysobalanaceae, Clusiaceae, Combretaceae, Connaraceae, Costaceae, Dichapetalaceae, Droseraceae, Elaeocarpaceae, Eriocaulaceae, Euphorbiaceae, Humiriaceae, Hypericaceae, Lauraceae, Lecythidaceae, Leguminosae, Malpighiaceae, Melastomataceae, Meliaceae, Moraceae, Myristicaceae, Myrtaceae, Ochnaceae, Olacaceae, Oleaceae, Opiliaceae, Orchidaceae, Passifloraceae (excluding former Turneraceae), Peraceae, Peridiscaceae, Phyllantaceae, Picramniaceae, Picrodendraceae, Poaceae, Proteaceae, Putranjivaceae, Rhizophoraceae, Rubiaceae, Rutaceae, Sapotaceae, Simaroubaceae, Siparunaceae, Solanaceae, Ulmaceae, Urticaceae, Violaceae, Vitaceae, Vochysiaceae, and Zingiberaceae—the list was revised and updated based on the ongoing work by taxonomic specialists (47 families) and by nonspecialist taxonomists based on a monograph/taxonomic treatment written by a family specialist (19 families). This work included adding to existing checklists more recently described species, newly documented range extensions, and revised synonymies based on newer taxonomies, and covered 10,555 species (75% of the total). Angiosperm family names follow those of Angiosperm Phylogeny Group IV (79). Growth form data were taken from original checklists and herbarium labels.

The biologically meaningful concept of lowland Amazon rain forest used here refers to the tropical rain forest biome with high above-ground biomass, high annual rainfall, and low seasonality without evolutionary adaptation to fire, long dry season, low annual rainfall, or low temperatures that occur across the Amazon, Orinoco, and Atlantic North Coast river basins (including Essequibo, Cuarantyne, etc.), as well as the Tocantins and Atlantic Western hydrological basins (including Mearim). Thus, our definition excludes savannas, seasonally dry forests, and montane areas at elevations >1,000 m, to focus on a single system within which organisms are thought to evolve and interact as a metacommunity over evolutionary time scales (48, 49). Our circumscription of the Amazon rain forest differs from the Amazon phytogeographic domain used in the Flora do Brasil. All species that reach ≥10 cm DBH during their life were considered trees, following previous studies of Amazon tree species diversity (5, 14).

Delivering a biome-specific checklist poses many challenges, a major one being that most published checklists follow political boundaries and usually include many different biomes. Such checklists do not always record in which biome(s) particular species occur, and in cases where they do, circumscriptions of biomes based on explicit criteria can differ. To deliver a taxonomically verified checklist that considers synonymy, growth form, and ecological conditions, we downloaded data from published checklists, filtering for species occurring <1,000 m elevation. The following search criteria for the country-level checklists were used: Bolivia: status endemic, native, or naturalized; distribution Beni, Cochabamba, La Paz, Pando, Santa Cruz; region zonas bajas; vegetation zone Bosque humedo, bosque semideciduo chiquitano, campos amazonicos; elevation 0–1,000 m; Colombia: status native or naturalized; biogeographic region Amazonia; elevation 0–1,000 m; Ecuador: status endemic, introduced, or native; provinces Morona-Santiago, Napo, Pastaza, Sucumbios, Zamora-Chinchipe; regions "Amazonian," "Andean and Amazonian," "Coastal, Andean and Amazonian," Galapagos and Amazonian," Galapagos, Andean and Amazonian," "Galapagos, Coastal, and Amazonian," and "Galapagos, Coastal, Andean, and Amazonian"; elevation 0–1,000 m; Peru: department Amazonas, Cuzco, Huanuco, Junin, Loreto, Madre de Dios, Pasco, Puno, San Martin, Ucayali; region Amazonian; elevation 0–1,000 m.

Results of each country-specific download were passed through the flora R package (80) to link with the most updated synonymy according to Flora do Brasil. We then ran occurrence record search for all resulting accepted species names from GBIF using the rgbif R package (81). Searches were limited to georeferenced records without coordinate issues. Climatic variables were then extracted for each occurrence point for mean annual temperature, minimum temperature of the coldest month, and mean annual precipitation derived from the interpolated temperature (WORLDCLIM v.1.3 Rel. 3; ref. 82) and the radar detected precipitation variables (TRMM; www.ambiotek.com/1kmrainfall/). Median values for each species were used to identify outliers (i.e., non-Amazonian species) within our dataset; these outliers were deleted after verification by taxonomic specialists confirmed their absence from Amazonian lowland rain forests.

In addition, previously published lists of Amazonian tree species and genera (14, 18) were reviewed by comparing them against published data sources (26–36). Fifty-five families, accounting for 9,346 species (80% of the total listed; see the list of families above, except for Araceae, Begoniaceae, Bromeliaceae, Costaceae, Droseraceae, Eriocaulaceae, Orchidaceae, Poaceae, Vitaceae, and Zingiberaceae), were reviewed by taxonomic specialists to calculate data quality estimates that were then extrapolated to the entire dataset. The families reviewed in detail include some of the most species-rich and dominant groups in the Amazonian flora, represent all growth forms and occur across a broad range of vegetation types within the Amazon rain forest (periodically flooded, terra-firme, and white-sand forests). In cases when a single taxon was referred to by multiple names due to the listing of synonyms and/or spelling variants, these names were considered duplicated synonyms. In cases when a single name had to be synonymized with a name not already listed, these names were not counted as errors.

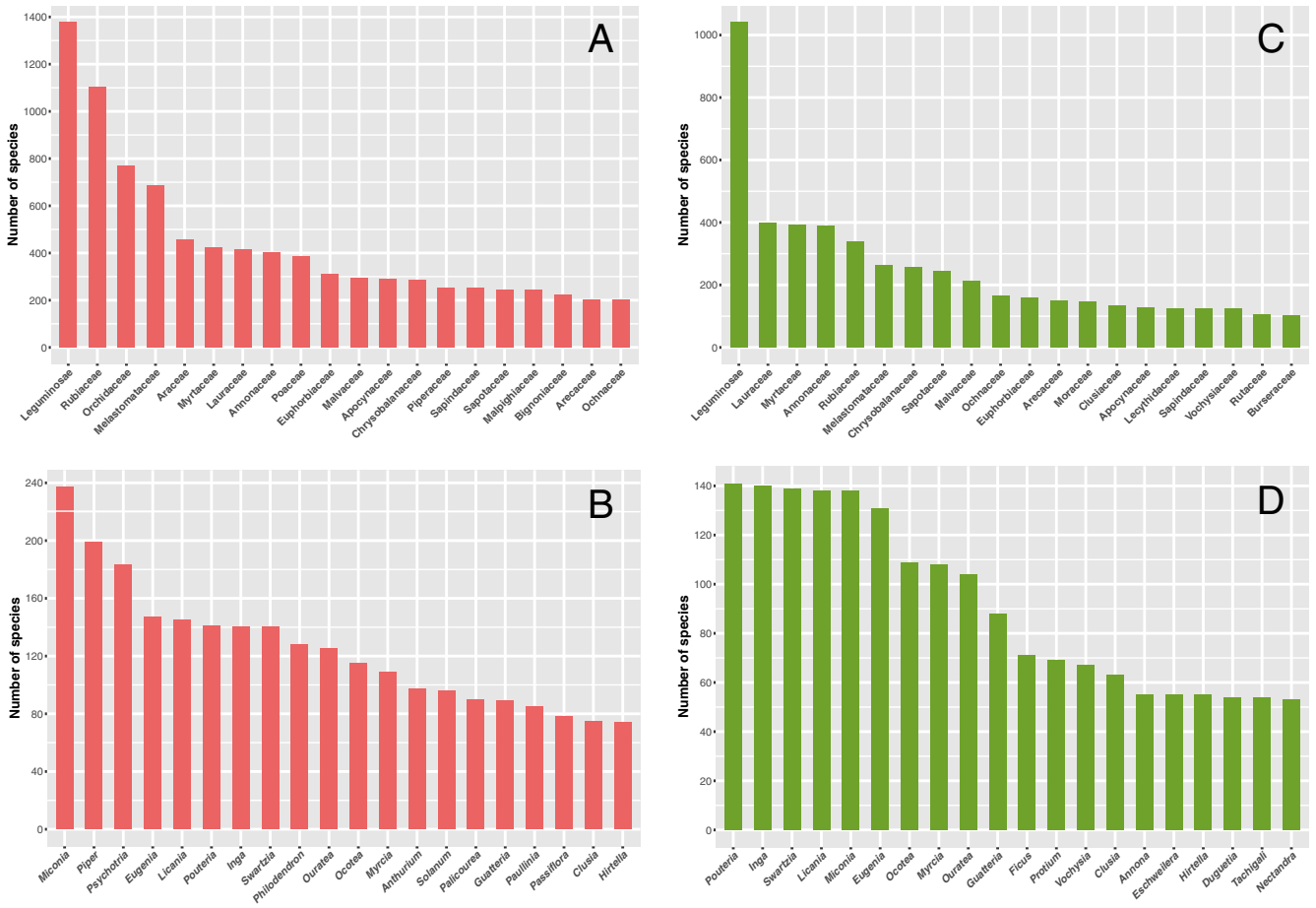

Fig. S1. Species-rich seed plant families and genera recorded in lowland Amazon rain forests. The 20 most species-rich families (*A*) and genera (*B*) of the entire flora, and the 20 most-species rich families (*C*) and genera (*D*) for trees only.

Dataset S1. Checklist of seed plants for the lowland Amazon rain forests ≤1,000 m elevation. The dataset is based on published checklists of Brazil, Bolivia, Colombia, Ecuador, Peru, and the Guiana Shield (Venezuela, Surinam, Guyana, and French Guiana; refs. 26–36)

Dataset S1

Dataset S2. List of errors detected in published checklists of Amazonian tree species and genera based on the review by taxonomic specialists (14, 17, 18)

Dataset S2