Referee #3

This manuscript presents a vegetation plot dataset (HDM-Plot) for the Hengduan Mountains, which is potentially valuable given the region's ecological importance and data scarcity. The dataset is relatively rich in taxonomic and structural attributes and could serve as a useful baseline for vegetation classification and biodiversity studies. However, in its current form, the dataset coverage is too limited for widespread community adoption. And the manuscript suffers from insufficient methodological rigor, unclear sampling representativeness, and overinterpretation of descriptive patterns. I have several comments.

Response: We sincerely appreciate your approbation to the manuscript and your valuable comments. Please refer to replies as following.

Comment 1 A major concern of this manuscript is the relatively limited spatial coverage of the dataset, which substantially restricts its broader applicability. While the dataset may be valuable within the specific study region, its geographic scope is too narrow to support generalizable insights or to serve as a widely applicable resource for the research community. As currently presented, the dataset's utility appears largely confined to localized or case-specific analyses, limiting its relevance for comparative studies, large-scale synthesis, or integration into existing global or continental databases. This significantly reduces its potential impact as a community resource, which is a key expectation for data papers.

Response: First, we would like to clarify that the study region of the HDM-Plot dataset covers approximately 728,797 km^2, accounting for about 8% of China's land area. The region spans a large elevational range from 119 to 7,213 m. Therefore, the geographic scope is relatively broad for a mountain vegetation plot dataset in southwestern China, and even in the world.

Second, we believe that the dataset remains a valuable community resource for mountain vegetation studies. It provides standardized and openly accessible plot-level records from a highly heterogeneous and relatively underrepresented mountain region.

These data can provide regionally specific plot evidence for updating *Vegegraphy of China* and for further improving the revised vegetation classification system of China. In addition, it also provides an important regional complement to global vegetation plot compilations such as the sPlot, which rarely include the vegetation plots from southwestern China and the Tibetan Plateau. The localized vegetation plot dataset can be integrated into existing global plot database of sPlot, and further contributes to large-scale synthesis.

Third, the dataset includes taxonomic, community structural, abundance-related, geographic, and vegetation classification information. When its sampling scope and limitations are properly considered, it can support vegetation classification, biodiversity assessment, regional comparison, and integration with broader vegetation databases. Therefore, our plot dataset has great potential significance for ecological studies. We then revised the manuscript, especially improved the manuscript on the insufficient methodological rigor, unclear sampling representativeness, and overinterpretation of descriptive patterns as you pointed out. The improved manuscript emphasized the value of the dataset as a standardized baseline dataset for the HDM-Plot study region.

Comment 2 The manuscript does not provide sufficient justification or evaluation of the sampling design and its representativeness across the Hengduan Mountains region. Plot locations were selected partly based on logistical feasibility and road accessibility, which raises concerns about potential spatial bias. However, no quantitative assessment is provided regarding how well the sampled plots cover the environmental gradients (e.g., elevation, climate, vegetation types) of the study region. Without an explicit analysis of sampling coverage and potential spatial bias, it is difficult to assess whether the dataset can reliably represent regional vegetation patterns.

Response: We agree that the sampling design and representativeness of the dataset needed to be described more clearly. In the revised manuscript, we have clarified that the survey followed a coverage-oriented field sampling design. Its main goal was to capture the major vegetation belts and transition zones shaped by the mountain–valley system and climatic gradients across the study region. Therefore, plots were established along various longitudinal, latitudinal, and elevational gradients, with emphasis on major mountain–valley systems, vegetation physiognomic types, and local transitions among forest, shrubland, and grassland communities. At the same time, plot placement was constrained by field logistics, road accessibility, and terrain conditions in complex mountain environments. Moreover, we have expanded Figure 2 to present the realized sampling coverage. The revised Figure 2 shows the spatial distribution of plots (a), the coverage of plots in MAT–MAP climatic space (b), and the plot proportion and relative area of each mapped vegetation type (c) and elevational belt (d).

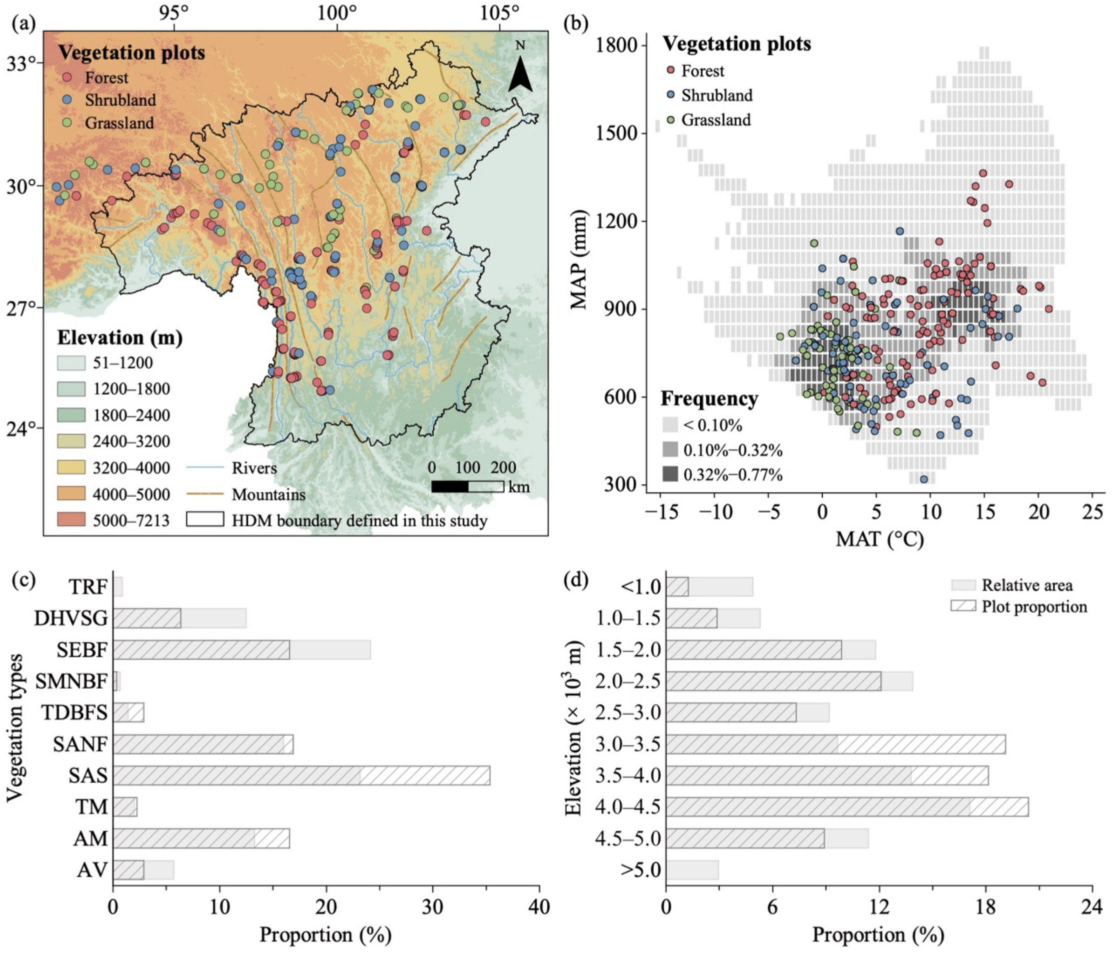

Figure 2. Spatial **(a)**, climatic **(b)**, vegetation-type **(c)**, and elevational **(d)** coverage of vegetation plots in the HDM-Plot dataset. Elevation data was derived from the SRTM 90 m dataset (Farr et al., 2007) and resampled into 1 km grid cells. Mountain and river data were obtained from the Digital Mountain Map of China Dataset (Nan et al., 2015) and Natural Earth (https://www.naturalearthdata.com, last access: 12 March 2026), respectively. Mean annual temperature (MAT, °C) and mean annual precipitation (MAP, mm) were derived from a 1 km monthly climate dataset for China covering 1991–2020 (Hu et al., 2025). Grey squares in panel **(b)** indicate the frequence of MAT–MAP combinations among all 1 km grid cells within the study boundary, based on two-dimensional bins of 0.5 °C for MAT and 50 mm for MAP. In panels (c) and

(d), grey bars indicate the relative area of each vegetation type and each elevational belt, and hatched bars indicate the plot proportion of surveyed plots within each group. Vegetation types were extracted from the 1:1,000,000 Vegetation Map of the People's Republic of China (Editorial Committee of Vegetation Map of China, the Chinese Academy of Sciences, 2007a). TRF, tropical rain forest; DHVSG, dry-hot valley shrubby grassland; SEBF, subtropical evergreen broadleaf forest; SMNBF, subtropical mountains mixed needleleaf and broadleaf forest; TDBFS, temperate deciduous broadleaf forest and shrubland; SANF, subalpine needleleaf forest; SAS, subalpine shrubland; TM, temperate meadow; AM, alpine meadow; and AV, alpine cushion and sparse vegetation, and bare land.

Comment 3 The dataset includes plots with highly variable sizes across vegetation types (e.g., forests: 10–20 m; shrublands: 2–10 m; grasslands: 1–2 m). However, the manuscript does not address how this heterogeneity affects the comparability of ecological metrics derived from these plots. Key variables such as species richness, importance values (IV), and structural attributes are strongly dependent on plot area. Without appropriate standardization (e.g., rarefaction or size-controlled analyses), comparisons across vegetation types and along environmental gradients may be biased by plot size rather than ecological differences.

Response: We acknowledge that plot-size heterogeneity can affect the comparability of ecological metrics, especially species richness. Other reviewers have raised the similar question. Therefore, in the revised manuscript, we first describe the plot-size design explicitly. Plot size was determined according to community physiognomy and stand heterogeneity. Grassland plots were mainly 1 m × 1 m, shrubland plots were mainly 5 m × 5 m, and forest plots were mainly 10 m × 10 m or 10 m × 20 m. Local adjustments were made because of terrain constraints, especially slope, and field operability in complex mountain environments. We have added supplementary information reflecting the spatial and elevational distributions of plot sizes.

Second, we have revised the analysis of species richness patterns with elevation. Species richness is now analyzed at the plot level separately for forest, shrubland, and grassland plots using generalized additive models, with elevation included as a smooth term and plot area included as a covariate. The fitted trends were then standardized to representative plot areas of 100 m² for forests, 25 m² for shrublands, and 1 m² for grasslands.

Third, we have also revised the elevational patterns of growth forms and life forms. These metrics are now first calculated as plot-level proportions and then averaged within each elevational belt, thereby reducing the influence of unequal plot numbers and plot sizes among elevation belts.

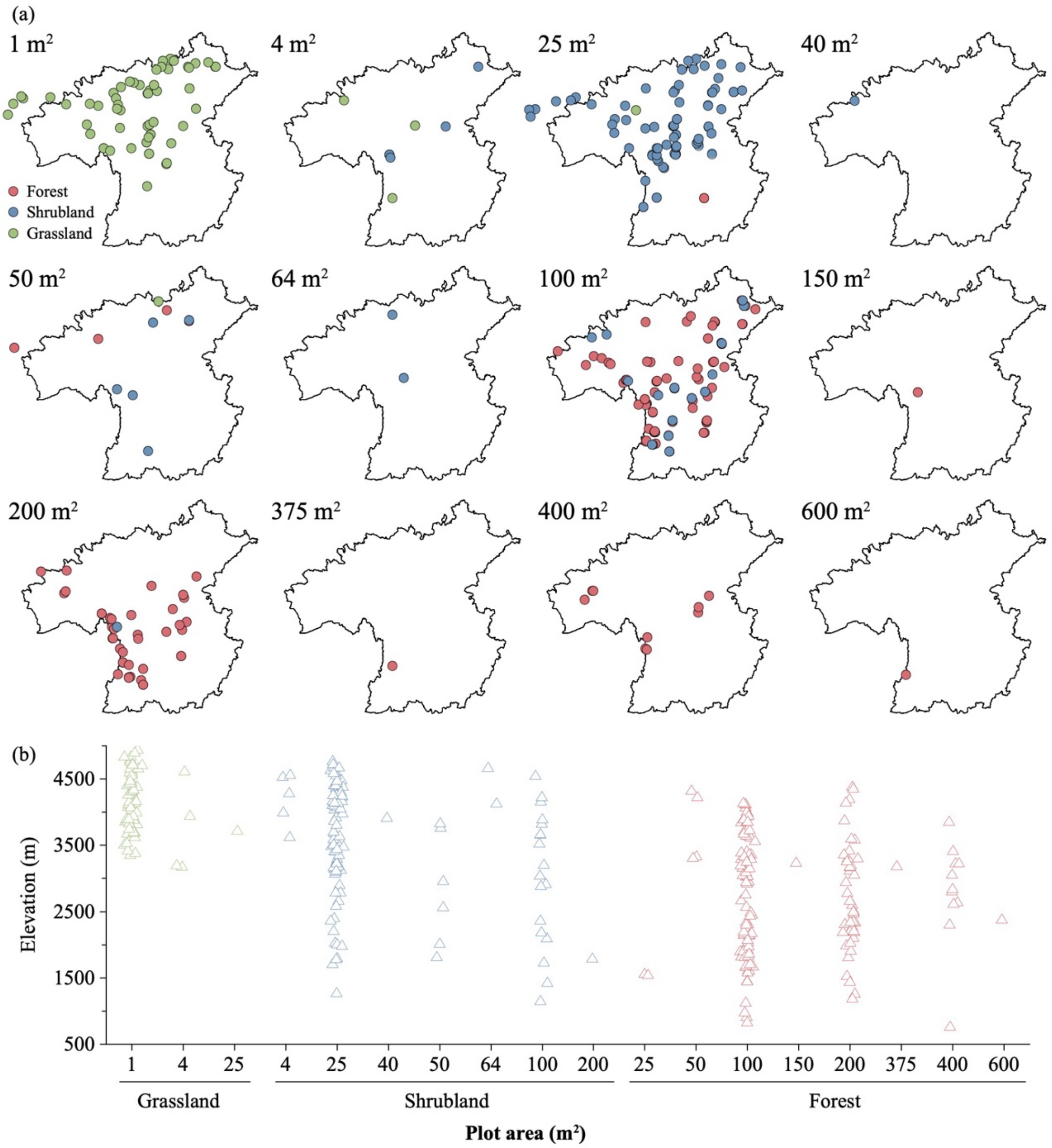

Figure S1. Horizontal **(a)** and elevational **(b)** distributions of plot areas in the HDM-Plot dataset.

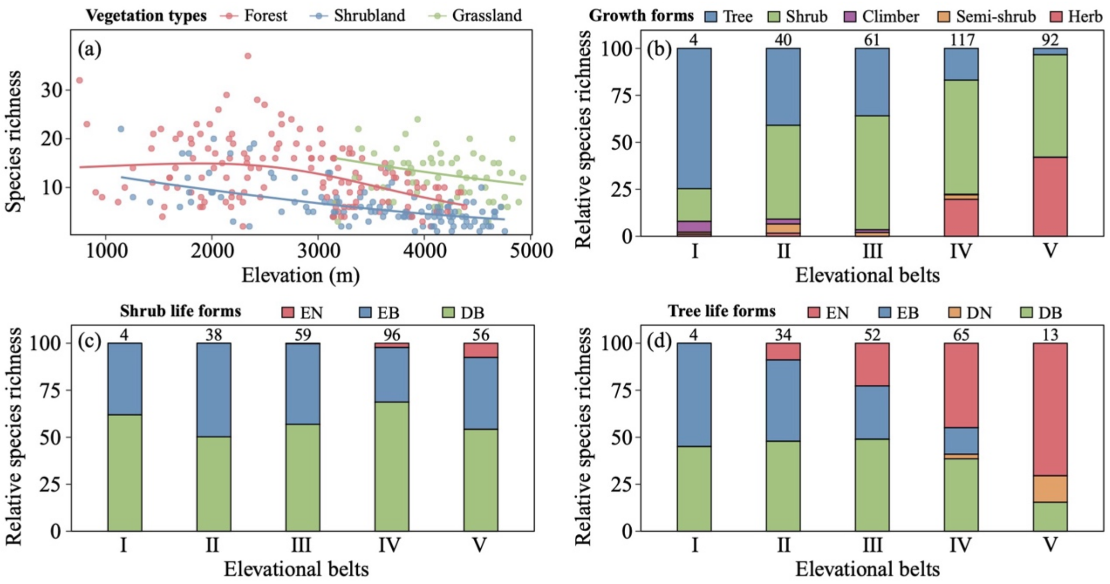

Figure 8. Elevational patterns of plot-level species richness **(a)**, growth forms **(b)**, and woody life forms **(c, d)** in the HDM-Plot dataset. In panel **(a)**, points represent observed species richness in individual plots, and fitted lines show elevational trends estimated using generalized additive models with plot area included as a covariate. Predictions were standardized to representative plot areas of 100 m^2 for forests, 25 m^2 for shrublands, and 1 m^2 for grasslands. Panels **(b–d)** show mean within-plot proportions across elevational belts. Elevational belts are defined as I, 0–1000 m; II, 1000–2000 m; III, 2000–3000 m; IV, 3000–4000 m; and V, 4000–5000 m. n denotes the number of plots included in each elevational belt. DB, deciduous broadleaf; DN, deciduous needleleaf; EB, evergreen broadleaf; and EN, evergreen needleleaf.

Comment 4 The vegetation classification framework relies on a set of predefined thresholds (e.g., importance value criteria for dominant species) and expert-based decisions. However, the manuscript does not provide sufficient justification for these thresholds, nor does it evaluate the sensitivity of classification outcomes to these choices. Furthermore, the authors introduce modifications to existing classification schemes (e.g., new shrubland formation types), which may reduce comparability with other datasets and classification systems. The absence of data-driven validation (e.g., clustering or ordination analyses) further limits the reproducibility and robustness of the classification.

Response: First, the vegetation classification in this manuscript follows the revised vegetation classification system of China and is based on field-based community physiognomy, vertical structure, constructive species, and species importance values. The calculation of species importance values and the threshold criteria used to identify dominant and co-dominant species follow established practices in vegetation survey and classification. Second, based on field survey and species importance values, we cautiously identified several new shrubland formations. These shrubland formations were widely recorded in our field survey but did not appear in the current vegetation classification system of China, and we therefore suggest that they could be considered in future revisions of the vegetation classification system of China. This is also one of the motivations of our vegetation survey, namely to provide field-based plot evidence for improving the updated vegetation classification framework of China. Third, our primary goal is to provide a field-based classification framework consistent with the revised vegetation classification system of China, which is important for vegetation mapping, classification comparison, and future work related to *Vegegraphy of China*. A clustering approach based only on species composition may not fully capture community physiognomy, vertical structure, dominance, and constructive species, especially in a dataset spanning vegetation types across strong environmental gradients. Anyway, we still conducted a two-way indicator species analysis based on plot species composition. The first-level division broadly separated alpine grassland plots from non-alpine grassland plots, consistent with the main physiognomic contrast in the dataset. However, finer-level divisions did not fully correspond to the field-based vegetation formations, possibly reflecting local species turnover, rare taxa, and uneven sampling among vegetation types. Therefore, we have added a discussion noting that quantitative classification can serve as a useful complementary approach, while the field-based classification following Guo et al. (2020) remains the primary classification framework for this data paper.

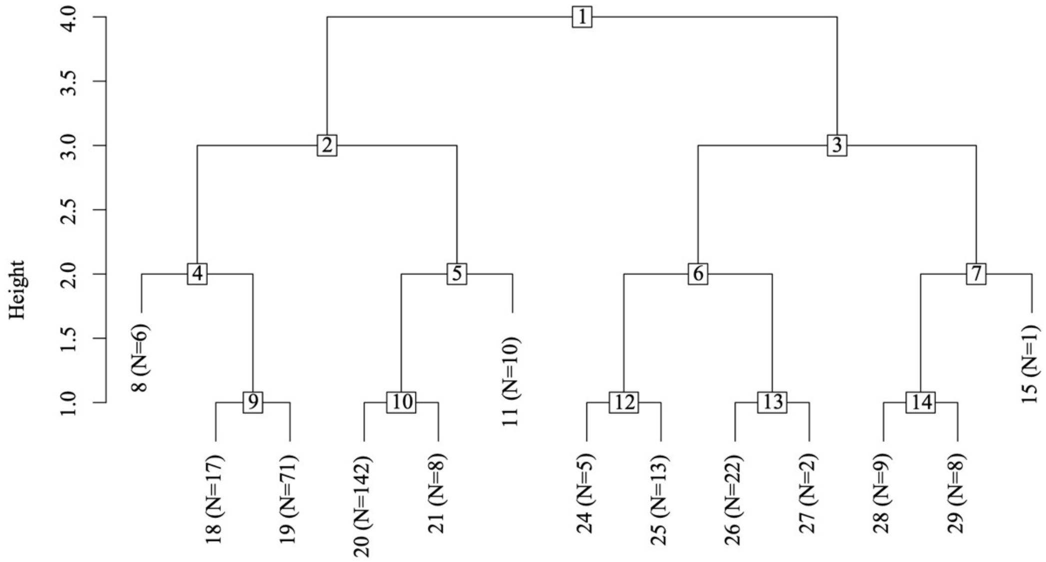

Figure S3 Two-way indicator species analysis of vegetation plots in the HDM-Plot dataset.

Comment 5 The manuscript presents several ecological patterns (e.g., unimodal elevational richness patterns, shifts in growth forms) as generalizable findings. However, these interpretations are not sufficiently supported by analyses that control known sources of bias, including uneven sampling effort, spatial clustering, and plot size heterogeneity. Without accounting for these factors, the observed patterns may reflect sampling artifacts rather than true ecological gradients.

Response: We agree that these ecological patterns should be interpreted cautiously. Accordingly, we reanalyzed the elevational patterns of species richness, growth forms, and life forms by accounting for unequal plot numbers and plot-size heterogeneity (see our response to Comment 3 for details). In the revised manuscript, we have reframed these results as descriptive summaries of the surveyed plots in the HDM-Plot dataset, rather than as general ecological conclusions for the entire Hengduan Mountains region.