

Response to the Referees

(HDM-Plot: a plot dataset of plant communities across three-dimensional zonal vegetation in the Hengduan Mountains and adjacent regions, southwestern China)

(essd-2026-204)

Dear Editor,

Thank you and the referees again for the helpful and constructive comments on our manuscript. We have carefully considered all comments and revised the manuscript accordingly. All changes are highlighted in red in the marked-up version of the revised manuscript. In addition, we provide below a detailed point-by-point response to all referee comments, including the corresponding changes made in the revised manuscript.

We hope that this revised manuscript meets the requirements for publication in *Earth System Science Data*.

Sincerely,

Yili Jin (yili01@zjnu.edu.cn) and Jian Ni (nijian@zjnu.edu.cn)

On behalf of all co-authors

Referee 1

This manuscript presents the HDM-Plot dataset, a plot-based vegetation dataset across the Hengduan Mountains region, comprising 314 plots sampled between 2022–2024 and covering a wide elevational gradient (754–4,932 m), with detailed species, structural, and environmental information. Overall, the dataset is valuable, timely, and potentially highly useful for studies of mountain biodiversity, vegetation classification, and macroecological analyses. However, as a data paper, the manuscript still requires substantial revision to improve transparency in sampling design, clarify dataset scope, and strengthen technical validation and usability.

Response: We thank the referee for the positive comments and constructive suggestions for our manuscript. We have revised the manuscript accordingly, especially focusing on the sampling design, dataset scope, technical validation, usability, and others. The detailed corrections and explanations are listed below.

Comment 1: *One critical issue concerns the geographic extent of the dataset. Based on Figure 1 and other maps throughout the manuscript, the spatial coverage—particularly in the southeastern part—clearly includes a substantial portion of the Yunnan–Guizhou (Yun–Gui) Plateau, rather than being restricted to the Hengduan Mountains sensu stricto. This has important implications for both the description and interpretation of the dataset. Relatedly, the manuscript describes HDM vegetation as being dominated by subtropical evergreen broadleaf forests (Lines 73–74; light blue region in Fig. 1) and reports a relatively high proportion of tropical areal-types (35.4%; Line 24). These statements appear inconsistent with the widely accepted view that the Hengduan Mountains flora is predominantly temperate in character, within the Sino-Himalayan floristic region. While the HDM is indeed a transitional zone between tropical Southeast Asia and temperate East Asia, its floristic identity is generally shaped by temperate elements at mid–high elevations, with tropical components being comparatively limited and largely confined to lower elevations. This discrepancy may arise from the inclusion of non-HDM areas (e.g., the Yun–Gui Plateau) in the dataset. I recommend that the authors explicitly clarify the sampling extent and adopt one of the following approaches: (1) restrict the dataset strictly to the Hengduan Mountains by removing sites apparently located on Yun–Gui Plateau & revise all corresponding maps and summaries, or (2) acknowledge that the dataset covers adjacent Plateau, revise the manuscript accordingly, and avoid presenting results as representative of the Hengduan Mountains alone. In addition, Figure 2 appears to include several plots in the northwestern corner that fall outside the defined study region. The authors seem to include these plots in downstream analyses (and maps), and if so, apply a consistent treatment to all peripheral plots (including those in the southeastern plateau).*

Response: First, we acknowledge that the dataset is not restricted to the Hengduan Mountains sensu stricto, but also includes adjacent regions, especially along the southeastern margin adjoining the Yun–Gui Plateau and the northwestern margin adjoining the Tibetan Plateau. Our surveys aimed to document vegetation composition and distribution along the major mountain–valley systems of the Hengduan Mountains. Because of the continuity of regional topography, the gradual transition of vegetation belts, and the practical arrangement of survey routes, the actual survey extent included plots in adjacent regions. These peripheral plots record important vegetation transitions from the Hengduan Mountains toward adjacent regions, so we retained them and treated them consistently in all analyses. Therefore, we adopted the second approach suggested by the referee. To avoid ambiguity, we have revised the Title, Abstract, and the manuscript throughout to explicitly state that the dataset covers “the Hengduan Mountains and adjacent regions”. However, to maintain consistency with the published dataset product and its DOI record, we have retained the dataset name “HDM-Plot”. The corresponding changes made in the manuscript are provided below.

Line 2 (in the marked-up version of the revised manuscript). “HDM-Plot: a plot dataset of plant

communities across three-dimensional zonal vegetation in the Hengduan Mountains and adjacent regions, southwestern China”

Lines 11–12. “Here we present the HDM-Plot, a plot-based vegetation dataset compiled from 314 plots surveyed during four campaigns between 2022 and 2024 across the Hengduan Mountains and adjacent regions, ...”

Lines 62–63. “Over recent decades, extensive vegetation surveys have been conducted across the HDM and its adjacent mountains and plateaus, ...”

Lines 100–101. “Figure 1. Horizontal (a) and elevational (b) patterns of vegetation distribution in the Hengduan Mountains (HDM) and adjacent regions—the HDM-Plot study region.”

Line 122. “To provide an up-to-date baseline of vegetation composition and spatial patterns in the HDM and adjacent regions, ...”

Lines 136–147. “In this study, we use the HDM boundary (24.08°–34.32° N, 93.13°–106.16° E, 119–7,213 m; Fig. 2a) following Yu et al. (1989) and Zhang et al. (1997) as the geographical core of the study region. Because of the continuity of regional topography, the gradual transition of vegetation belts, and the practical arrangement of survey routes, the actual survey extent included adjacent regions along the southeastern and northwestern margins (Fig. 2a). These peripheral plots record important vegetation transitions from the HDM toward adjacent regions, and were therefore retained. Unless otherwise specified, the “HDM-Plot study region” in this manuscript refers to the HDM and adjacent regions covered by our field surveys, rather than to the HDM *sensu stricto*.”

Lines 149–150. “Climatically, the HDM-Plot study region spans tropical, subtropical, temperate, and alpine zones, ...”

Lines 159–160. “Figure 2. Spatial (a), climatic (b), vegetation-type (c), and elevational (d) coverage of vegetation plots in the HDM-Plot dataset.”

Line 554. “These patterns reflect that the floristic composition of the HDM-Plot study region retains a tropical–subtropical elements and also incorporating temperate–alpine attributes.”

Lines 619–686. We have replaced all occurrences of “HDM” with “study region”.

Line 722. “It provides detailed raw records from 314 vegetation plots spanning major vegetation types in the HDM and adjacent regions, ...”

Lines 732–733. “..., the study region, especially the HDM has extremely complex topography and highly heterogeneous vegetation, ...”

Line 755. “This is the first comprehensive vegetation plot dataset for the HDM and adjacent regions to our knowledge with broad spatial coverage and representation of diverse vegetation types.”

Second, we added **Table S1** to summarize the relative areas of vegetation regionalization units and mapped vegetation types, respectively, within the study region. The results show that the

subtropical evergreen broadleaf forest region occupies the largest proportion of the study region (86.7%), whereas the tropical monsoon rain forest and rain forest region (8.5%) and the Qinghai–Xizang Plateau alpine vegetation region (4.7%) occupy much smaller proportions. The major vegetation types include subtropical evergreen broadleaf forest (24.2%), subalpine shrubland (23.2%), subalpine needleleaf forest (16.0%), alpine meadow (13.3%), and dry-hot valley shrubby grassland (12.5%). To avoid ambiguity with the commonly accepted understanding of the vegetation of the Hengduan Mountains *sensu stricto*, we have revised the relevant text in the Introduction and now explicitly present these patterns as spatial characteristics of vegetation within the HDM-Plot study region.

Lines 75–85. “In the vegetation regionalization scheme of China, the study region spans three vegetation regionalization units: the subtropical evergreen broadleaf forest region, the Qinghai–Xizang Plateau alpine vegetation region, and the tropical monsoon rain forest and rain forest region (Fig. 1a; Table S1; Editorial Committee of Vegetation Map of China, the Chinese Academy of Sciences, 2007b). Across the region, from the southeast toward the northwest, vegetation types shift from subtropical evergreen broadleaf forests and dry-hot valley shrubby grasslands to subalpine needleleaf forests, subalpine shrublands, and alpine meadows (Fig. 1a; Table S1; Editorial Committee of Vegetation Map of China, the Chinese Academy of Sciences, 2007a).”

Table S1 Relative area of vegetation regionalization units and mapped vegetation types in the HDM-Plot study region

Vegetation unit	Area (km ²)	Relative area (%)
Vegetation regionalization		
I	632,189	86.7
II	62,040	8.5
III	34,248	4.7
Vegetation types		
TRF	6,469	0.9
DHVSG	91,381	12.5
SEBF	176,385	24.2
SMNBF	5,173	0.7
TDBFS	10,284	1.4
SANF	116,924	16.0
SAS	169,306	23.2
TM	14,654	2.0
AM	96,771	13.3
AV	41,378	5.7

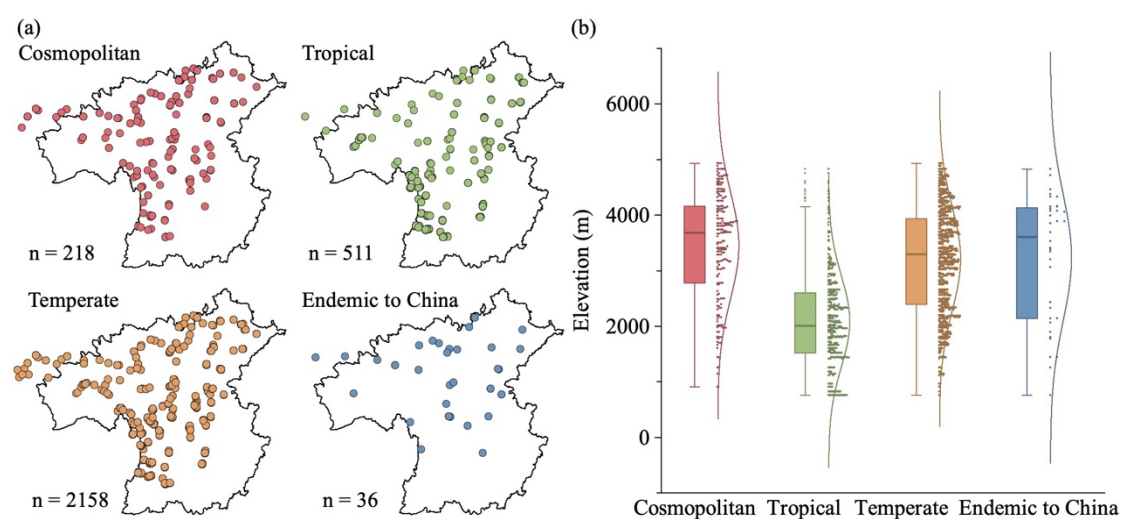
Third, we have checked and supplemented the analysis of floristic characteristics. The original statistics were performed at the family and genus levels, with each family or genus assigned to one areal-type category. The newly added **Table S2** provides the number of species contained within each areal-type category. The results show that although tropical areal-types account for 35.4% of the recorded genera, these genera contain only 23.3% of the recorded species. In contrast, temperate genera contain 66.7% of the recorded species. In addition, we added **Figure S2** to show the spatial distributions of genus-level areal-type groups based on plot–genus occurrence records. The analysis indicates that temperate genera are mainly associated with high elevations, whereas tropical genera are more closely associated with low elevations. Both temperate and tropical elements are broadly distributed within the study region, but the number of occurrence records of temperate genera is nearly four times than that of tropical genera. These additional results further clarify that the HDM-Plot dataset records transitional floristic features across the Hengduan Mountains and adjacent regions. However, when species representation and plot-level occurrence frequency are considered, temperate elements are clearly dominant, consistent with the widely accepted understanding of the regional flora. To make it clear to the reader, we have revised the Abstract and Section 4.3 to present these results at the dataset level and to clarify that, at the genus level, temperate elements are dominant and tropical elements are secondary.

Lines 25–27. “Floristically, genus-level areal-types in the HDM-Plot dataset are dominated by temperate elements (54.1%), followed by tropical elements (35.4%).”

Lines 564–574. “However, when the number of species contained in each areal-type group is considered, temperate genera account for 66.7% of the recorded species, whereas tropical genera account for 23.3% (Table S2). A plot–genus occurrence analysis further shows that temperate genera dominate plot-level occurrence records and are mainly associated with high elevations, whereas tropical genera are more closely associated with low elevations (Fig. S2). Both temperate and tropical genera are spatially widespread within the study region, but the number of plot-level occurrence records of temperate genera is nearly four times that of tropical genera (Fig. S2). Therefore, the dataset records transitional floristic features across the Hengduan Mountains and adjacent regions, while temperate elements remain dominant when species representation and plot-level occurrence are considered.”

Table S3 Floristic areal-types at family and genus levels in the HDM-Plot dataset.

Areal-types	Family level (percentage, %)		Genus level (percentage, %)	
	No. of families	No. of species	No. of genera	No. of species
1	30.8	48.6	6.6	8.6
2	24.8	12.1	11.6	9.6
3	8.5	4.3	2.9	3.1
4	2.6	0.4	5.3	2.5
5	1.7	0.3	2.9	1.6
6	/	/	2.6	1.2
7	1.7	1.2	10.0	5.3
8	18.8	29.4	23.2	47.2
9	5.1	2.5	7.1	5.1
10	0.9	0.1	6.3	3.8
11	/	/	1.8	1.8
12	/	/	0.8	0.4
13	/	/	0.8	0.4
14	5.1	1.2	14.0	7.9
15	/	/	4.0	1.3
Cosmopolitan	30.8	48.6	6.6	8.6
Tropical	39.3	18.3	35.4	23.3
Temperate	29.9	33.1	54.1	66.7
Endemic to China	/	/	4.0	1.3

**Figure S2.** Spatial (a) and elevational (b) distributions of genus-level areal-type groups based on plot-genus occurrences. n denotes the total number of plot-genus occurrence.

Comment 2: The sampling design and representativeness. The manuscript states that plots were placed across representative mountains and valleys, while also considering logistics and accessibility. However, the sampling design remains insufficiently documented for a data paper -- there is no clear stratification scheme (by elevation / vegetation / region), potential accessibility bias is not quantified, and the overall sampling rationale remains unclear (representativeness, coverage of extremes, opportunistic survey). For transparency and future data reuse, the authors should clarify the sampling design rationale and goals. Additionally, the authors could provide a table or supplementary figures to show: (a) numbers of plots per vegetation types (ideally alongside the relative area of each vegetation type in the study region); (b) numbers of plots per elevational band (e.g., 500-m intervals). These would be helpful information to interpret the data.

Response: We agree that the sampling design and representativeness of the dataset needed to be described more clearly. Similar comments were also raised by the other two referees. The main goal of our survey was to capture the major vegetation belts and transition zones shaped by the mountain–valley system and climatic gradients. Plots were therefore placed 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. We have added these details in Section 3.1.

As suggested, we have expanded Figure 2 to show the realized sampling coverage. Another referee also suggested that the original climate distribution plot could be improved by presenting the climatic space as a density distribution. We therefore redrew Figure 2 accordingly. The revised Figure 2 shows the spatial distribution of plots (a), their climatic coverage in MAT–MAP space (b), and the plot proportion and relative area of each vegetation type (c) and each elevational belt (d). The corresponding figure caption and text have also been revised accordingly.

Lines 201–207. “To capture the major vegetation belts and transition zones shaped by the regional mountain–valley and climatic gradients, we adopted a coverage-oriented field sampling design. Plots were set up across representative mountains and valleys of the HDM and adjacent regions along various longitudinal, latitudinal, and elevational gradients. The survey aimed to cover major vegetation physiognomic types, representative mountain–valley systems, and local transitions among forest, shrubland, and grassland communities. Field logistics, road accessibility, and terrain conditions were also considered during plot selection.”

Lines 157–189.

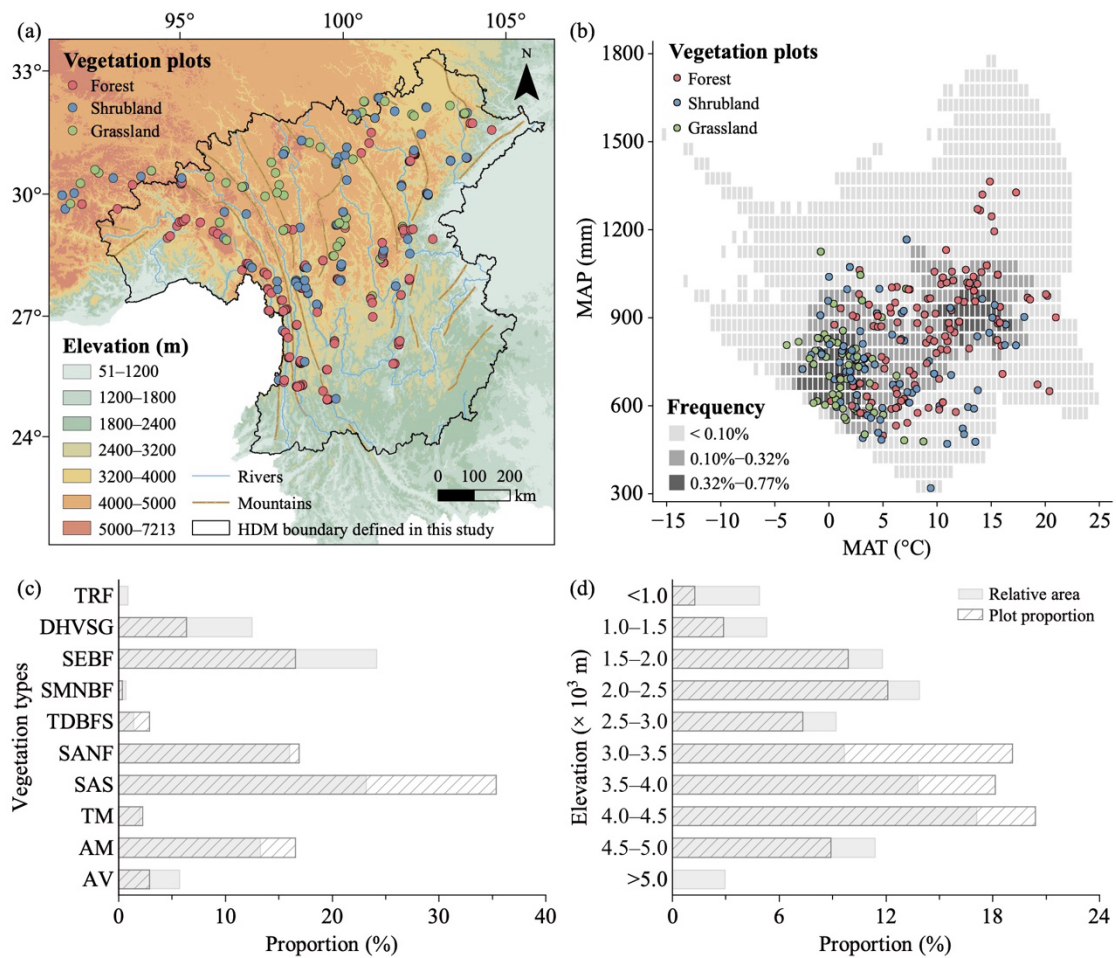


Figure 2. Spatial (a), climatic (b), vegetation-type (c), and elevational (d) coverage of vegetation plots in the HDM-Plot dataset. Elevation data were derived from the SRTM 90 m dataset (Farr et al., 2007) and resampled into 1 km grid cells. Mountain and river data were obtained from the Digital Mountain 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 frequency 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.

Lines 852–853. “Hu, X. F., Shi, S. L., Zhou, B. R., and Ni, J.: A 1 km monthly dataset of historical and future climate changes over China. *Sci. Data*, 12, 436, <https://doi.org/10.1038/s41597-025-04761-y>, 2025.”

Comment 3: Interpretation of ecological patterns. The manuscript reports patterns such as: unimodal richness along elevation and growth-form shifts across gradients. Given the non-random sampling design and uneven spatial distribution of plots, these results should be presented more cautiously. They are best interpreted as descriptive summaries of the dataset, rather than as general ecological conclusions about the Hengduan Mountains region. I recommend explicitly reframing these results to avoid overinterpretation.

Response: We agree that these patterns should be interpreted cautiously. In the revised manuscript, we have reframed the elevational patterns of species richness, growth forms, and woody life forms in Figure 8 as descriptive summaries of the surveyed plots in the HDM-Plot dataset, rather than as general ecological conclusions for the entire region. More importantly, the other two referees also noted that heterogeneity in plot sizes and the imbalance in plot numbers may affect these results. Therefore, we reanalyzed the elevational patterns of these ecological attributes. The detailed methods are provided in our response to Referee #2, Comment 1. Accordingly, we have revised the relevant descriptions in the Abstract and Section 4.2. We have also checked the full manuscript to ensure that all descriptive results are explicitly presented as patterns based on the study region covered by the HDM-Plot dataset.

Lines 23–25. “Species richness, growth forms, and life forms show clear elevational changes **within the HDM-Plot dataset.**”

Lines 493–504. “**In the HDM-Plot study region, plot-level species richness shows distinct elevational trends among vegetation types after accounting for plot area (Fig. 8a). Forest plots maintain relatively high species richness from low to middle elevations, followed by a decline toward higher elevations. Shrubland plots show a decreasing trend along the elevational gradient. Grassland plots are restricted to middle- and high-elevation belts, with relatively high richness at the lower part of their observed elevational range and a gradual decline toward higher elevations.**”

Lines 505–528. “**Growth-form composition varies clearly across elevational belts in surveyed plots (Fig. 8b). Trees dominate the lowest elevational belt and decline with increasing elevation. Shrubs remain the major component from low-middle to high elevations and are especially prominent in the middle-elevation belts. Herbs increase strongly toward the highest elevational belt. Woody life-form composition also shifts with elevation (Fig. 8c, d). For shrubs, deciduous broadleaf shrubs dominate most elevational belts, whereas evergreen broadleaf shrubs contribute substantially across the elevational gradient, particularly from low to middle elevations. Evergreen needleleaf shrubs are absent or rare at lower elevations and occur mainly the upper elevational belts (Fig. 8c). Tree life forms show stronger elevational turnover (Fig. 8d). Evergreen broadleaf trees are more common at low elevations and decrease sharply toward higher elevations. Deciduous broadleaf trees contribute substantially from low to middle-high elevations but decline in the highest belt.**

Evergreen needleleaf trees **increase with elevation** and **become dominant in the upper belts**. Deciduous needleleaf trees are largely restricted to high-elevation belts (Fig. 8d).”

Comment 4: *Figure elements. Several figures could be substantially improved in terms of clarity and presentation. For example, multi-panel figures should include panel labels (e.g., a, b, c, d) to clearly separate different components. In Figure 1, the left panel could be (a) horizontal vegetation type distributions, and the right panel could be (b) elevational distribution. For Figure 3/4/5/6, there could be four panels, (a) for spatial patterns of Families, (b) for genera, (c) for elevational patterns of Families, and (d) for genera. Similar suggestion for Figure 11. And figure captions need to be revised correspondingly. For some figures, units are missing. Elevation units (“m”) should be explicitly indicated in Figure 1/2/3/4/5/6. Also, units for MAT (°C) and MAP (mm) are missing in Figure 2 and should be added. For Scatterplots by groups, such as elevational patterns of plots in Figure 3/4/5/6/11, though jittering helps to separate points, but many are overlaid due to the large amount. I recommend that these figures could be modified to violin plots to show the density of plots along elevation, which would better represent distribution patterns. For Figure 7, since piecharts are not ideal (and largely redundant with numeric labels). Stacked barplots would provide clearer and more comparable information.*

Response: We have systematically revised the relevant figures to improve clarity and readability. First, we added panel labels to all multi-panel figures from Figure 1 to Figure 11 and revised the corresponding captions accordingly. We also updated the figure citations in the main text so that they refer to specific subpanels where appropriate. Because these are systematic changes applied throughout the manuscript and involve all figures and many figure citations, we do not list each individual line number here. All corresponding changes are shown in the marked-up version of the revised manuscript. For brevity, we only show the revised Figure 1 here as a representative example.

Lines 98–120.

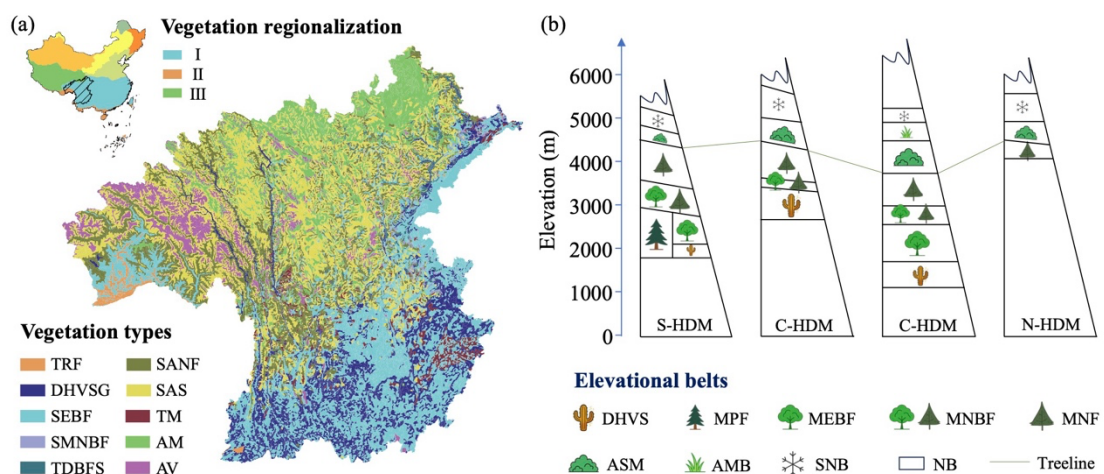


Figure 1. Horizontal (a) and elevational (b) patterns of vegetation **distribution** in the Hengduan

Mountains (HDM) and adjacent regions—the HDM-Plot study region. Vegetation regionalization was obtained from the Vegetation Regionalization Map of China (Editorial Committee of Vegetation Map of China, the Chinese Academy of Sciences, 2007b). I, subtropical evergreen broadleaf forest region; ...

Second, we added the missing units to the Figures 1–6, Figure 8, and Figure 10, including elevation (m) and, in Figure 2, MAT (°C) and MAP (mm). The corresponding changes were made in Lines 98–99, 157–158, 351–352, 395–396, 432–433, 468–469, 529–530, and 689–690.

Third, we replaced the jittered elevational scatterplots in Figures 3–6 and the original Figure 11 with violin plots with embedded boxplots, which more clearly summarize the elevational density and distribution range of different taxa. Accordingly, we have revised all descriptions of spatial and elevational distribution patterns in Section 4.1 in Lines 318–346, 370–395, 411–432, and 451–467. A similar comment regarding the use of density-based plots was also raised by Referee #2.

In addition, to improve clarity and better link vegetation formations with their physiognomic appearance and spatial distributions, we merged the original Figures 10 and 11 into a single revised Figure 10. Because Figures 3–6 have the same figure structure and all show the spatial distribution and elevational density of dominant families and genera, differing only among vegetation formation groups, we present only the revised Figure 3 here as an example.

Lines 351–356.

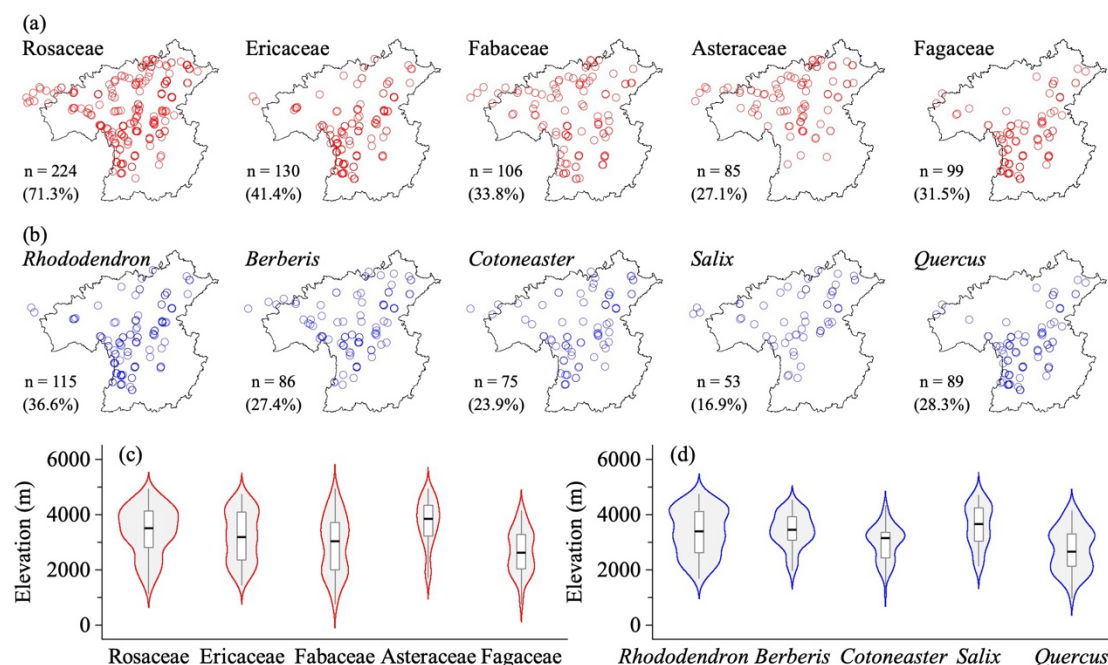


Figure 3. Horizontal (a, b) and elevational (c, d) patterns of dominant plant families (a, c) and genera (b, d) in all vegetation plots in the HDM-Plot dataset. n denotes the number of plots in which each dominant family or genus was recorded, and values in parentheses indicate the proportion of

the total survey plots.

Lines 596–604 and 689–704.

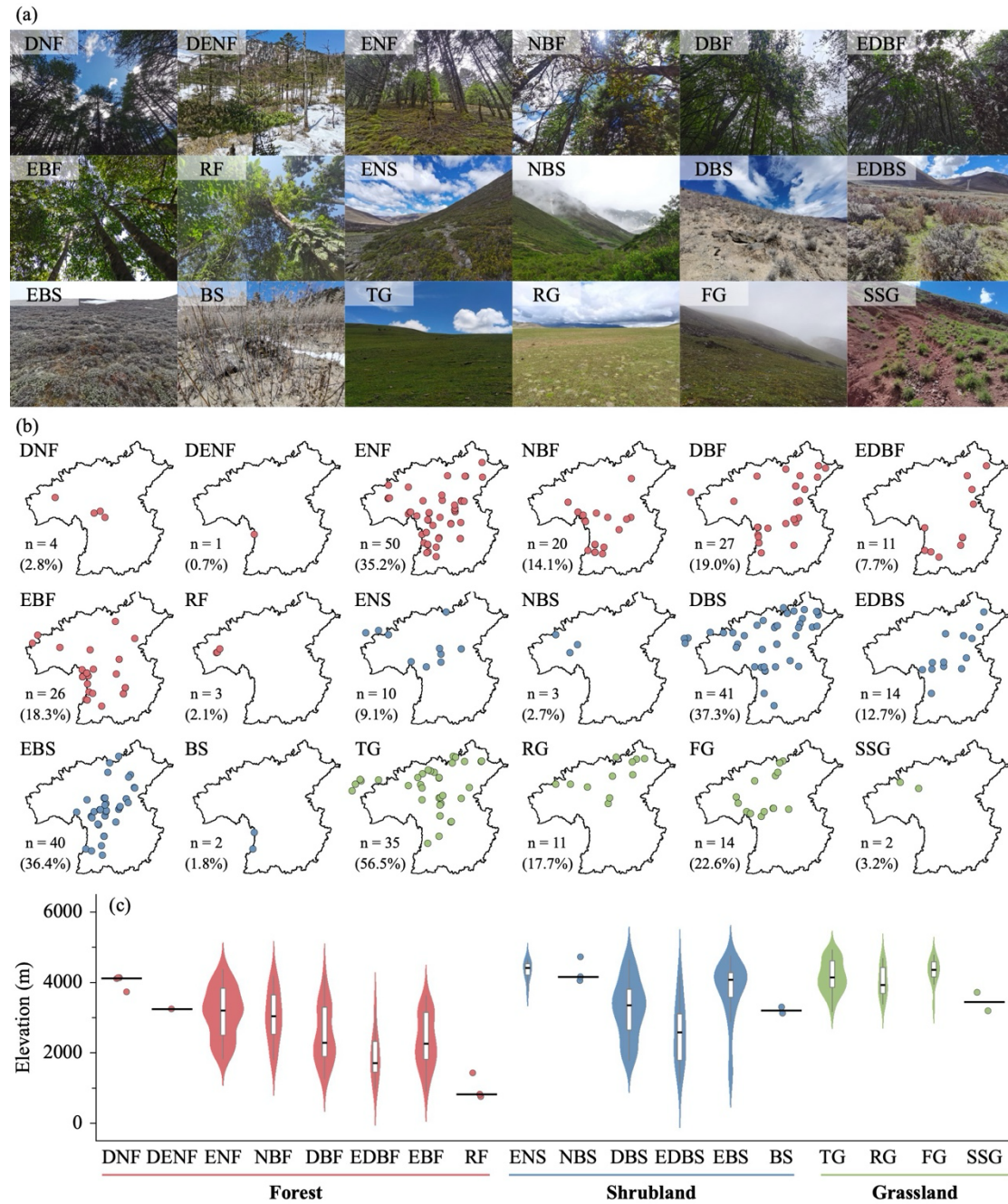


Figure 10. Representative photographs (a), horizontal distribution (b), and elevational distribution (c) of vegetation formations in the HDM-Plot dataset. Red, blue, and green points represent forest, shrubland, and grassland formations, respectively. *n* denotes the number of plots for each vegetation formation, and values in parentheses indicate the proportion of the corresponding formation group. Violin plots with embedded boxplots are shown for vegetation formations represented by at least five plots, whereas formations with fewer than five plots are displayed as individual points only. Black horizontal lines reflect median elevation. DNF, deciduous needleleaf forest; ...

Fourth, as suggested, we replaced the pie charts in Figure 7 with stacked bar plots.

Lines 485–492.

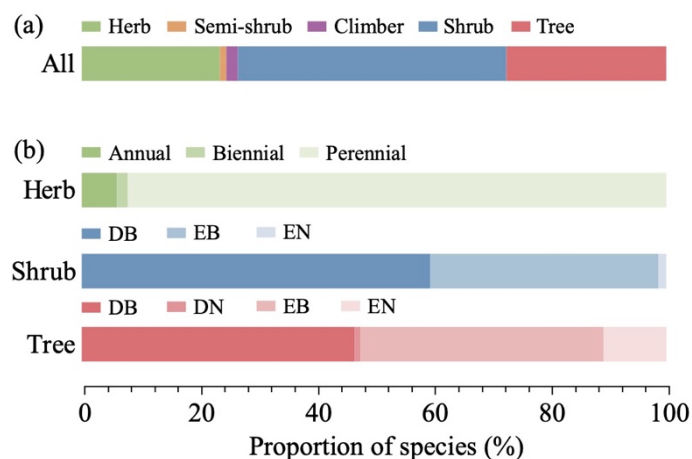


Figure 7. Growth-form composition of all species (a) and life-form composition within herbaceous, shrub, and tree species (b) surveyed in the HDM-Plot dataset. Bars show the proportion of species in each category. DB, deciduous broadleaf; DN, deciduous needleleaf; EB, evergreen broadleaf; and EN, evergreen needleleaf.

Comment 5: Line 9: “investigations”: investigation.

Response: Corrected as suggested in Line 9.

Comment 6: Line 12: “in altitudes of 754–4,932 m”: of/spanning altitudes of 754–4,932 m.

Response: Revised to “spanning altitudes of 754–4,932 m” in Line 13.

Comment 7: Line 126: “The HDM cover...”: The HDM covers ..., or The Hengduan Mountains cover...

Response: Revised to “The HDM covers ...” in Line 135.

Comment 8: Line 254: “Along the ranges of elevation”: Across the elevational gradient, or Along the elevational range surveyed...

Response: Revised to “Along the elevational range surveyed ...” in Lines 324–325.

Comment 9: Line 182: what is community height? How community height and total coverage are visually estimated in the field? Were standardized protocols used across observers to ensure consistency?

Response: In the HDM-Plot dataset, community height was defined as the maximum height of the dominant vegetation layer within a plot. Specifically, in forest plots, it referred to the visually estimated height of the tallest tree in the tree layer; in shrubland plots, it was measured or estimated

as the height of the tallest shrub layer, using a tape measure where possible; and in grassland plots, it was measured as the maximum height of the herbaceous leaf layer. Total plot coverage was visually estimated as the vertically projected percentage cover of all plant species within a plot. These measurements and estimates followed the same field criteria throughout all survey campaigns and were conducted by experienced vegetation investigators to ensure consistency. We have added these details to Section 3.1 and revised the corresponding description in the dataset summary table (Table 4).

Lines 236–246. “Community height was defined as the maximum height of the dominant vegetation layer within a plot. Specifically, in forest plots, it referred to the visually estimated height of the tallest tree in the tree layer; in shrubland plots, it was measured or estimated as the height of the tallest shrub layer using a tape measure where possible; and in grassland plots, it was measured as the maximum height of the herbaceous leaf layer. Total coverage was visually estimated as the vertically projected percentage cover of all plant species within each plot. Disturbance intensity was assessed directly at four levels: none, weak, medium, and strong. These measurements and estimates followed the same field criteria throughout all survey campaigns and were conducted by experienced vegetation investigators to ensure consistency.”

Line 718. “Community height (m): Maximum height of the dominant vegetation layer within a plot”

Comment 10: “Abundance” is recorded (Line 13), but it is unclear whether this refers to: counts, coverage, or others, across forest, shrubland, and grassland plots? The authors need to clarify this in the main text to explain how data collected behind Table 4.

Response: In the HDM-Plot dataset, abundance refers to count data, namely the number of individuals or clumps, rather than coverage. For plants occurring as discrete individuals, each individual was counted separately. For clumped plants, distinguishable clumps were used as the counting unit, and the number of individuals within clumps was additionally noted when identifiable. The recording unit differed among vegetation types. In forest and shrubland plots, woody plants were recorded by individual or clump, so the same species could have multiple records within a plot. In grassland plots, herbaceous plants were recorded by species, with each species represented by a single record containing its total number of individuals or clumps. The relative abundance used in the calculation of importance values was also based on the number of individuals or clumps. To clarify this point, we have replaced “abundance” with “number of individuals or clumps” in the Abstract (Line 14), Section 3.1 (Line 218 and Line 224), and Table 4 (Line 718). We have also supplemented the description of recording units for different vegetation types in Section 3.1.

Lines 225–233. “The number of individuals or clumps was used as the count-based abundance measure. For species occurring as discrete individuals, each individual was counted separately. For

clumped plants, distinguishable clumps were used as the counting unit, and the number of individuals within clumps was additionally noted when identifiable. In forest and shrubland plots, woody plants were recorded by individual or clump; therefore, the same species could have multiple records within a plot. In grassland plots, herbaceous plants were recorded by species, with each species represented by one record containing the total number of individuals or clumps within the plot.”

Lines 289–291. “Relative abundance was calculated from the number of individuals or clumps, and all relative metrics were expressed as percentages of the corresponding plot total.”

Comment 11: Table 3 is very long (nearly four pages) and would be better placed in the Supplementary Material or provided as part of the dataset rather than in the main text.

Response: As suggested, we have moved Table 3 (**Line 605**) to the Supplementary Material as Table S4. The corresponding citations in the main text have been updated accordingly.

Referee 2

The manuscript introduces the HDM-Plot dataset, compiled from four field campaigns conducted in 2022–2024 in the Hengduan Mountains of southwestern China, which is a global biodiversity hotspot. The geographic and elevational coverage is impressive, and the data structure appears rich enough to support vegetation classification, conservation planning, and ecological analyses. The inclusion of raw plot data, species lists, importance values, and classification tables is a strong asset. I acknowledge the difficulty to conduct field work in this region and appreciate the authors’ effort in making such dataset publicly available. However, I still have a few concerns and think that the preprint and the usability of the dataset would be improved by the following comments.

Response: We sincerely thank the referee for the careful review and constructive comments on our manuscript. According to the positive and detailed comments, we have made some changes to our manuscript. Please refer to replies as following.

Comment 1: Plot-size heterogeneity needs more clarification. The authors note that “plot size was determined following community physiognomy and stand heterogeneity,” with forest plots typically 10 m × 10 m to 20 m × 20 m, shrubland plots 2 m × 2 m to 10 m × 10 m, and grassland plots 1 m × 1 m to 2 m × 2 m. That is a very large difference in sampling area among vegetation types. It would therefore be helpful to explain more explicitly how this was considered in the analyses. Please

clarify whether any standardization or rarefaction was used for species richness comparisons, and whether plot-size distributions in space, along elevation, or for different vegetation formations could be summarized in the main text or supplementary materials to give a clear idea of the sampling patterns.

Response: We agree that plot-size heterogeneity needs to be more clearly described and considered in the analyses associated with species richness in Figure 8. In our survey, plot size was not designed to be uniform across all vegetation types, but was determined according to community physiognomy and stand heterogeneity. In general, the sizes of grassland plots were mainly 1 m × 1 m, of shrubland plots were mainly 5 m × 5 m, and of forest plots were mainly 10 m × 10 m or 10 m × 20 m. Local deviations occurred because of topographic constraints, especially slope, and field operability in complex mountain–valley terrain. To make the plot-size design more transparent, we added **Figure S1** and **Table S2** to show the spatial and elevational distributions of plot areas and their distributions among vegetation formations. These results show that the most common plot areas were 1 m² for grasslands, 25 m² for shrublands, and 100 m² or 200 m² for forests, and that the major plot-area classes were broadly distributed across the surveyed region and along the elevational gradients. We have supplemented Section 3.1 with more information on plot-size determination and its field constraints.

Lines 208–216. “Plot size was determined following community physiognomy and stand heterogeneity. The sizes of grassland plots were mainly 1 m × 1 m (91.9% of grassland plots), of shrubland plots were mainly 5 m × 5 m (70.0%), and of forest plots were mainly 10 m × 10 m (56.3%) or 10 m × 20 m (29.6%). Local adjustments in plot size were made because of terrain constraints, especially slope, and field operability in complex mountain environments. The dominant plot size covered broad spatial and elevational ranges within the surveyed distribution of their corresponding vegetation types (Fig. S1; Table S2).”

We also acknowledge that the original analysis of species richness along elevation did not account for plot-size heterogeneity. Therefore, we revised the analysis of richness patterns. We did not use rarefaction, because abundance records were based on the number of individuals or clumps and are not directly comparable across vegetation plots. Instead, we analyzed plot-level species richness separately for forest, shrubland, and grassland plots using generalized additive models, with elevation 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. In addition, the previous mountain-scale comparison was removed because plot number within different vegetation types was insufficient for robust modelling (Figure 8a).

The elevational patterns of growth-form and life-form composition were also recalculated at

the plot level (Figure 8b–d). Specifically, we first calculated the relative proportion of each growth-form or life-form category within each plot, and then averaged these plot-level proportions within each elevational belt. This procedure helps reduce the influence of differences in plot number and plot size among elevational belts. The relevant text revisions have been shown in our response to Referee #1, Comment 3. Here, we provide the revised Figure 8, its caption, and the newly added supplementary figure and table.

Lines 529–545.

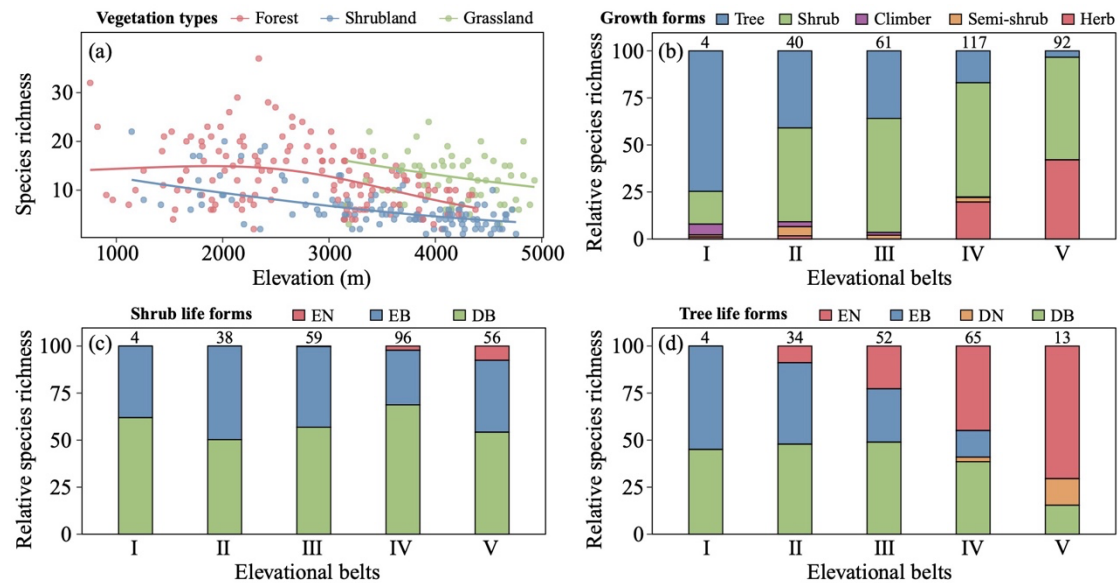


Figure 8. Elevational patterns of plot-level species richness (a), growth forms (b), and woody life forms (c, d) in the HDM-Plot dataset. In panel (a), points represent observed species richness in individual plots, and fitted lines show elevational trends estimated using generalized additive models with plot area included as a covariate. Predictions were standardized to representative plot areas of 100 m² for forests, 25 m² for shrublands, and 1 m² for grasslands. Panels (b–d) show mean plot-level proportions within each elevational belt. 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.

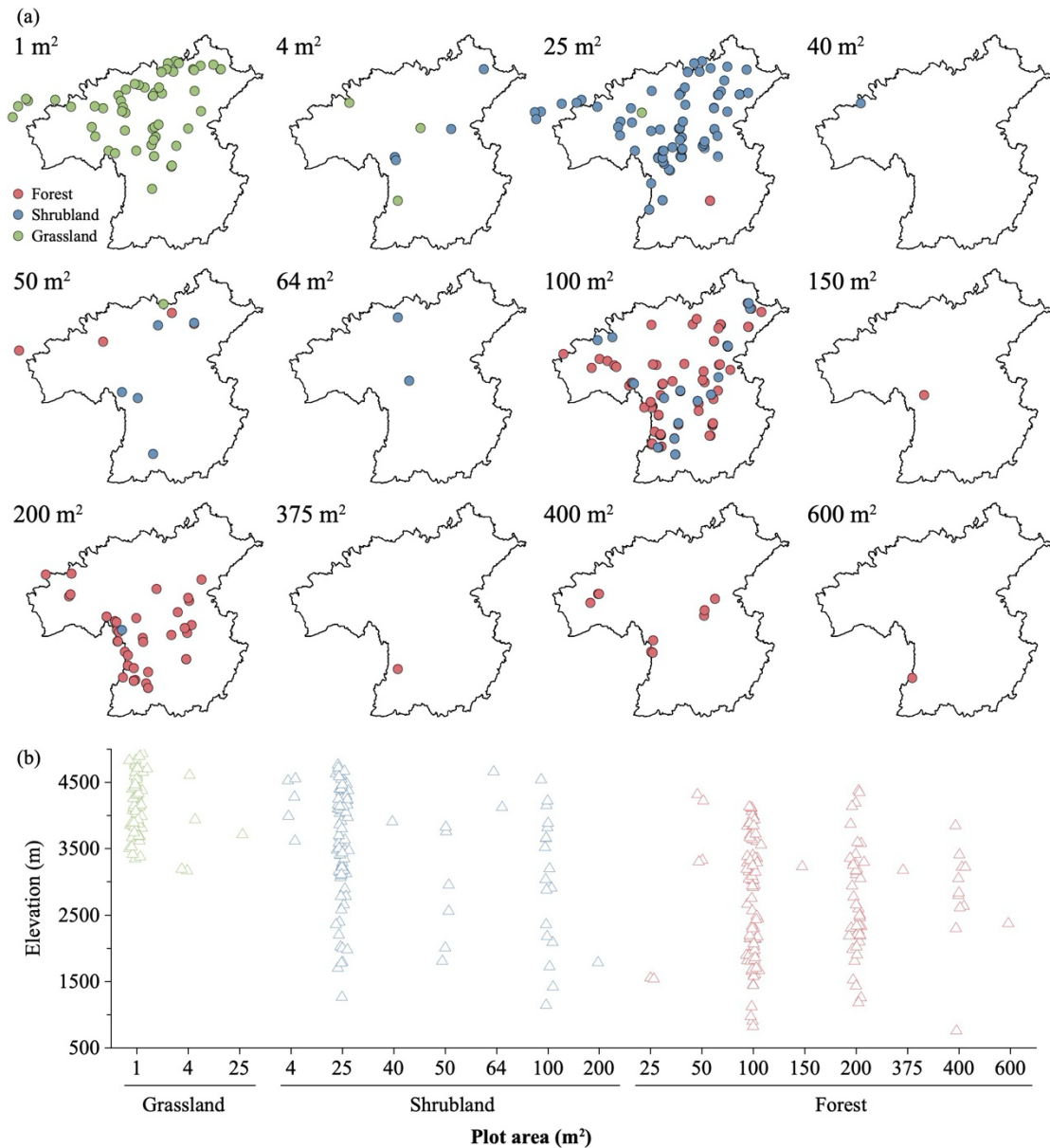


Figure S1. Horizontal (a) and elevational (b) distributions of plot areas in the HDM-Plot dataset.

Comment 2: Strengthen the dataset description by summarizing more of the measured variables beyond species composition. The assessment of the dataset largely constrained to species diversity in its current form. Since the dataset includes structural and abundance-related information, a few additional summaries would help readers better appreciate its value and scope. For example, patterns of DBH, community height, coverage, or abundance would be informative, especially for forest and grassland plots. It may also be useful to show how species richness varied across disturbance levels so the readers would have a better understanding of the potential limitation of the dataset, given that disturbance intensity was recorded for each plot and many of the plots were sampled along the road.

Response: We agree that the original manuscript focused mainly on species aspect, whereas the dataset also includes other important community variables, such as community height and coverage. To better demonstrate the value of the dataset, we have expanded Section 4.4 by describing how these variables vary among vegetation formations in relation to their horizontal and elevational patterns. Accordingly, we summarized species richness, community height, community coverage, and woody structural measurements, such as diameter at breast height (DBH) for trees and basal diameter (BD) for shrubs, in the newly added Table 3.

In addition, we examined the elevational patterns of these variables, as well as variation in species richness among disturbance-intensity classes. However, we did not present these exploratory analyses as major descriptive results of the dataset or use them for ecological inference, because they are strongly affected by vegetation type, plot number, plot size, and the non-experimental sampling design. Moreover, disturbance intensity was recorded as a relative plot-level descriptor rather than as part of a pre-designed disturbance gradient.

Lines 619–645. “DNF includes only one alliance (*Larix potaninii* var. *macrocarpa*) and appears at 3,732–4,136 m in the central and northwestern study region. It has 10 ± 2 species per plot, community height of 10.5 ± 3.9 m, coverage of $71 \pm 13\%$, and mean DBH of 11.9 ± 5.1 cm. DENF is also rare and was recorded from a single plot in Fugong (western border between China and Myanmar) at 3,247 m. This plot contains 4 species, community height of 15.6 m, coverage of 35%, and mean DBH of 10.1 cm. ENF is widespread throughout the study region at 1,809–4,377 m and is constructed by *Pinus*, *Abies*, *Picea*, *Juniperus*, and *Tsuga*. It includes 12 ± 6 species per plot, community height of 16.7 ± 7.4 m, coverage of $66 \pm 14\%$, and mean DBH of 17.1 ± 11.6 cm. NBF is concentrated in the southern study region at 1,801–4,189 m and typically combines *Pinus*, *Abies* and *Picea* with broadleaf trees such as *Quercus*, *Alnus*, and *Lithocarpus*. This formation records 14 ± 7 species per plot, community height of 18.9 ± 6.4 m, coverage of $68 \pm 17\%$, and mean DBH of 16.1 ± 7.9 cm. DBF is widely distributed at 1,256–4,217 m, excluding the northwestern study region, and is commonly constructed by *Alnus*, *Betula*, *Quercus*, and *Populus*. The corresponding plot-level values are 14 ± 7 species per plot, 13.1 ± 5.5 m in community height, $76 \pm 13\%$ in coverage, and 10.2 ± 5.8 cm in mean DBH. EDBF occurs patchily from the southwestern to northeastern study region at 966–3,298 m, where evergreen components mainly *Quercus* and *Castanopsis* co-occur with deciduous broadleaf taxa such as *Alnus*. It has 15 ± 6 species per plot, community height of 14.8 ± 6.4 m, coverage of $73 \pm 10\%$, and mean DBH of 10.7 ± 5.5 cm. EBF is widespread at low to middle elevations (906–3,636 m) in the study region and is most frequently constructed by *Quercus*. This formation surveys 12 ± 5 species per plot, 14.7 ± 8.8 m in community height, $74 \pm 16\%$ in coverage, and 15.4 ± 8.8 cm in mean DBH. RF is restricted to the lowest elevations in Medog, northwestern part of the study region (754–1,431 m) and is characterized by tropical and subtropical

trees. RF plots contain 24 ± 7 species per plot, community height of 35.3 ± 11.9 m, coverage of $80 \pm 10\%$, and mean DBH of 23.3 ± 10.9 cm (Fig. 10; Table 3)."

Lines 651–672. "ENS consists of two alliances (*Juniperus squamata* and *J. convallium*) and occurs mainly along the central and northwestern margin of the study region at 3,757–4,668 m. ENS plots have 5 ± 2 species per plot, community height of 2.5 ± 2.3 m, coverage of $78 \pm 18\%$, and mean BD of 3.4 ± 1.8 cm. NBS is rare and was surveyed from high-elevational area (4,044–4,720 m) in Chamdo, northwestern part of the study region, where *Juniperus* co-occurs with broadleaf shrubs including *Ribes*, *Salix*, and *Spiraea*. Its plot-level values are 6 ± 1 species per plot, 2.4 ± 1.0 m in community height, $60 \pm 33\%$ in coverage, and 2.6 ± 1.6 cm in mean BD. DBS is widespread across the study region at 1,772–4,662 m and is most frequently dominated by *Berberis*, *Salix*, *Rosa*, *Cotoneaster*, and *Sibiraea*. This formation includes 7 ± 4 species per plot, community height of 2.7 ± 1.7 m, coverage of $61 \pm 21\%$, and mean BD of 1.6 ± 0.6 cm. EDBS spans a broad elevational gradient (1,144–4,226 m) from the central to northeastern study region and features mixtures of evergreen (e.g., *Rhododendron* and *Daphne*) with deciduous components (e.g., *Rosa* and *Zanthoxylum*). EDBS plots contain 10 ± 6 species per plot, community height of 3.6 ± 3.1 m, coverage of $62 \pm 22\%$, and mean BD of 1.9 ± 1.2 cm. EBS is widely distributed from the southwestern to northeastern study region at 1,257–4,758 m and is commonly dominated by *Rhododendron* and *Quercus*. It has 5 ± 4 species per plot, community height of 2.5 ± 2.3 m, coverage of $69 \pm 17\%$, and mean BD of 1.6 ± 1.1 cm. BS is uncommon in the dataset and was found in Yunnan Province at 3,120–3,290 m and includes two alliances (*Fargesia gongshanensis* and *F. melanostachys*). BS plots record 5 ± 4 species per plot, community height of 5.4 ± 2.9 m, coverage of $68 \pm 11\%$, and mean BD of 2.7 ± 1.1 cm (Fig. 10; Table 3)."

Lines 675–688. "TG is widespread across the study region at 3,168–4,932 m and is strongly dominated by *Kobresia*, especially the widespread alpine meadow species *K. pygmaea* (24 plots). This formation has 12 ± 4 species per plot, community height of 0.061 ± 0.033 m, and coverage of $81 \pm 15\%$. RG occurs mainly in the northern study region at 3,379–4,701 m and is represented by *Carex*, with *C. enervis* frequently recorded. It contains 14 ± 5 species per plot, community height of 0.108 ± 0.102 m, and coverage of $79 \pm 25\%$. FG is concentrated from the central to northern study region at 3,345–4,784 m and is characterized by forb constructed communities, with *Argentina* as a common genus. Its plot-level values are 11 ± 6 species per plot, 0.079 ± 0.055 m in community height, and $77 \pm 16\%$ in coverage. SSG is rare and has a single alliance (*Artemisia vestita*), observed in dry-hot valleys in the northwestern study region at 3,186–3,710 m. The alliance has 5 ± 3 species per plot, community height of 0.300 ± 0.283 m, and coverage of $50 \pm 28\%$ (Fig. 10; Table 3)."

Lines 705–708.

Table 3 Summary of community characteristics and structure in the HDM-Plot dataset

Formations	SR	Community height (m)	Community Coverage (%)	DBH or BD (cm)
DNF	10 ± 2	10.5 ± 3.9	71 ± 13	11.9 ± 5.1
DENF	4	15.6	35	10.1
ENF	12 ± 6	16.7 ± 7.4	66 ± 14	17.1 ± 11.6
NBF	14 ± 7	18.9 ± 6.4	68 ± 17	16.1 ± 7.9
DBF	14 ± 7	13.1 ± 5.5	76 ± 13	10.2 ± 5.8
EDBF	15 ± 6	14.8 ± 6.4	73 ± 10	10.7 ± 5.5
EBF	12 ± 5	14.7 ± 8.8	74 ± 16	15.4 ± 8.8
RF	24 ± 7	35.3 ± 11.9	80 ± 10	23.3 ± 10.9
ENS	5 ± 2	2.5 ± 2.3	78 ± 18	3.4 ± 1.8
NBS	6 ± 1	2.4 ± 1.0	60 ± 33	2.6 ± 1.6
DBS	7 ± 4	2.7 ± 1.7	61 ± 21	1.6 ± 0.6
EDBS	10 ± 6	3.6 ± 3.1	62 ± 22	1.9 ± 1.2
EBS	5 ± 4	2.5 ± 2.3	69 ± 17	1.6 ± 1.1
BS	5 ± 4	5.4 ± 2.9	68 ± 11	2.7 ± 1.1
TG	12 ± 4	0.061 ± 0.033	81 ± 15	/
RG	14 ± 5	0.108 ± 0.102	79 ± 25	/
FG	11 ± 6	0.079 ± 0.055	77 ± 16	/
SSG	5 ± 3	0.300 ± 0.283	50 ± 28	/

Values are summarized at the plot level within each vegetation formation and are shown as mean ± SD. SR denotes species richness per plot. DBH or BD represents the mean diameter at breast height or basal diameter of woody species within each plot.

Comment 3: *The vegetation classification may benefit from a quantitative classification approach. In the vegetation classification section, 314 plots are divided into 142 alliance groups, and many groups contain only one plot based on Table 3. It raises the question of whether this level of detail is appropriate and whether all units need to be listed in the main table. The manuscript could also benefit from commenting on whether a quantitative classification approach, such as clustering based on species composition, might serve as a useful complement to the current descriptive framework.*

Response: We agree that the original Table 3 was too detailed for the main text. A similar concern was also raised by Referee #1. This is especially the case because the vegetation classification system of China provides a fine hierarchical classification, and many alliance groups and alliances in our dataset are represented by only one plot. To improve readability, we have moved the original

Table 3 from the main text to the Supplementary Material. In the revised main text, we now focus more on vegetation formation groups and vegetation formations, while retaining the detailed lower-level classification information in the Supplementary Material.

Lines 591–595. “Because these lower-level units are highly detailed and many are represented by only one plot, the full hierarchical classification is provided in Table S4 and in the published dataset, whereas the main text focuses on vegetation formation groups and vegetation formations (Fig. 10; Table 3).”

We also agree that quantitative vegetation classification can provide a useful complement to the descriptive vegetation classification framework. This issue was also pointed out by Referee #3. However, the primary aim of our classification was to maintain consistency with the revised vegetation classification system of China and to support future use of the dataset in vegetation classification, vegetation mapping, and the *Vegeography of China*. This framework uses field-based community physiognomy, vertical structure, constructive species, and species importance values. These attributes are difficult to fully represent using a clustering approach based only on species composition, especially for a dataset that spans forests, shrublands, and grasslands across strong environmental gradients. Nevertheless, following the two referees’ suggestions, we conducted an exploratory two-way indicator species analysis (TWINSPAN) based on species composition. The first-level division broadly separated alpine grassland plots from non-alpine grassland plots, indicating that the main compositional contrast in the dataset is consistent with major vegetation physiognomic differences. However, finer divisions were less directly aligned with the field-based vegetation formations, partly because they were influenced by local species turnover, rare taxa, and uneven sampling among vegetation types. To make this exploratory result available to users, we have added a new column to the vegetation classification sheet in the updated dataset, providing the final TWINSPAN group assigned to each plot. We have also added relevant text in the Methods and Summary to note that quantitative classification provides a useful complementary perspective, while the field-based classification following Guo et al. (2020) remains the primary framework for this data paper.

Lines 307–311. “In addition, two-way indicator species analysis (TWINSPAN) was further used as a complementary numerical classification of the vegetation plots. It is a divisive hierarchical classification method that progressively partitions plots according to differences in species composition and identifies indicator or diagnostic species associated with each split.”

Lines 759–764. “The vegetation classification in the HDM-Plot dataset follows the revised vegetation classification system of China (Guo et al., 2020), emphasizing field-based community physiognomy, vertical structure, constructive species, and species importance values. This approach

provides a field-based and nationally consistent framework for vegetation classification and future comparison with the *Vegegraphy of China*.”

Lines 777–785. “As a complementary assessment, we further numerically classified vegetation from the HDM-Plot dataset based on species composition using TWINSpan (Fig. S3). The first division broadly separated alpine grassland plots from non-alpine grassland plots, consistent with the major physiognomic contrast in the dataset. However, finer divisions did not always correspond to the field-based vegetation formations, probably reflecting local species turnover, rare taxa, and uneven sampling among vegetation types. Therefore, quantitative classification provides a useful complementary perspective, but the field-based classification following Guo et al. (2020) remains the primary framework for this data paper.”

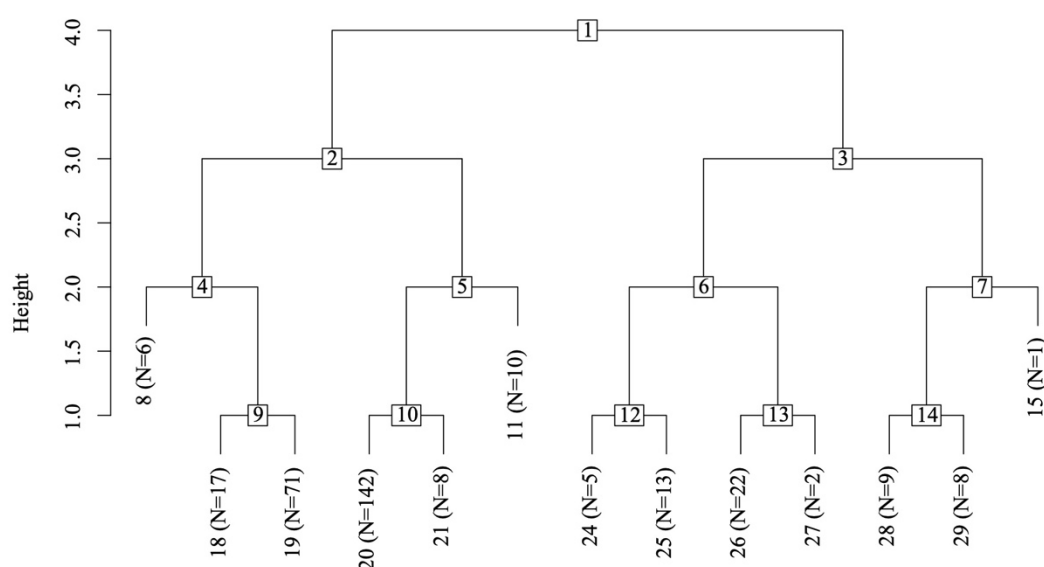


Figure S3. Two-way indicator species analysis of vegetation plots in the HDM-Plot dataset.

Comment 4: In addition, figures could be improved in regards of clarity. Fig. 2: Better to only highlight the few mountains that mentioned in the following analyses than numbering all the mountains in this region. Readers may feel it difficult to find where the five mountains used in Fig.8 for showing elevational gradient are. It would also be helpful to supplement the figure with plot density distribution against climatic space, as the deep valleys and mountains prevent the visualization of climatic condition change on the map and the dots representing single plot stacking on each other. Fig. 3-6: Consider adding density plots or frequency maps to show the distribution patterns more clearly. This would make it easier for readers to assess how frequently each family or genus occurs across the surveyed plots.

Response: We have revised the relevant figures to improve clarity and readability. In Figure 2a, we removed the numbering of mountains and rivers to reduce visual complexity. The numbering of individual representative mountains was also removed because the previous mountain-scale analysis

in Figure 8 has been removed from the revised manuscript, as explained in our response to Comment 1. As suggested, we added a climatic-space coverage panel (**b**) to Figure 2, showing the distribution of forest, shrubland, and grassland plots along MAT and MAP gradients. Grey squares indicate the frequency 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. The revised Figure 2 has already been provided in our response to Referee #1, Comment 2, and is therefore not repeated here.

Similarly, the comments on Figures 3–6 are consistent with those raised by Referee #1. We replaced the original jittered elevational scatterplots with violin plots with embedded boxplots. The revised example figure has been provided in our response to Referee #1, Comment 4.

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 thank the referee for the detained comments on our manuscript and for the valuable suggestions. Our point-by-point response are provided below.

***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 covered by the HDM-Plot dataset extends over approximately 728,797 km², accounting for about 8% of China's land area. It also spans a large elevational range, from 119 m to 7,213 m. Therefore, the geographic and elevational

scope of this dataset is broad for a mountain vegetation plot dataset from 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 the *Vegegraphy of China* and for further improving the revised vegetation classification system of China. In addition, the dataset provides an important regional complement to global vegetation plot compilations such as the sPlot, which currently include relatively few vegetation plots from southwestern China and the Tibetan Plateau. Therefore, the HDM-Plot dataset has the potential to be integrated into broader global plot databases and to contribute to large-scale vegetation 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 have revised the manuscript substantially, with attention to insufficient methodological rigor, unclear sampling representativeness, and overinterpretation of descriptive patterns, as pointed out by the referee. The revised manuscript now emphasizes the value of the dataset as a standardized baseline dataset for the HDM-Plot study region, while also clarifying its limitations.

Lines 726–729. “The dataset offers a robust, standardized data for studies of vegetation ecology, conservation planning, and ecological restoration in this biodiversity hotspot, and provides an important regional complement to global vegetation plot compilations such as the sPlot (Sabatini et al., 2021), 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.”

Lines 731–734. “First, although the surveyed plots cover broad vegetation types, climatic space, and elevational gradients (Fig. 2), the study region, especially the HDM has extremely complex topography and highly heterogeneous vegetation, and steep terrain often prevented the establishment of fully standardized plots.”

Lines 741–749. “Nevertheless, these limitations should be viewed in the context of field-based vegetation surveys in a topographically complex and highly heterogeneous mountain region. Assembling a large, structurally detailed plot dataset under harsh field conditions represents a vital contribution. More importantly, we believe that the dataset remains a valuable community resource for large-scale mountain vegetation studies, as it provides standardized and openly accessible plot-

level records from highly heterogeneous and relatively underrepresented mountain region. We expect the HDM-Plot dataset to provide a valuable reference for ongoing and future efforts of vegetation reassessment and ecological research across the region.”

Lines 793–801. “More broadly, the HDM-Plot dataset can also contribute to global vegetation ecology by improving the representation of Asian mountain ecosystems in plot-based research. Vegetation plots from southwestern China and the southeastern Tibetan Plateau remain relatively rare in global compilations, despite the high biodiversity and strong environmental heterogeneity of this region. By providing standardized field-based records from this underrepresented mountain system, the dataset can support cross-regional comparisons and large-scale syntheses of vegetation classification, biodiversity patterns, community structure, and ecosystem responses to environmental change.”

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. A detailed explanation of the sampling design and plot representativeness has been provided in our response to Referee #1, Comment 2. In the revised manuscript, we have clarified that the survey followed a coverage-oriented field sampling design and added a quantitative assessment of how well the sampled plots represent the major environmental gradients of the study region, including elevation, climate, and vegetation types. The revised Figure 2 shows the realized sampling coverage and exhibits that the surveyed plots span the major geographical space (Figure 2a), climatic space (Figure 2b), mapped vegetation types (Figure 2c), and elevational belts (Figure 2d) of the study region.

Lines 247–249. “These surveyed plots cover the major geographical space (Fig. 2a), climatic space (Fig. 2b), vegetation types (Fig. 2c), and elevational belts (Fig. 2d) of the study region.”

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. A closely related concern was also raised by Referee #2, and a detailed explanation of our revised analyses is provided in our response to Referee #2, Comment 1. Briefly, we performed generalized additive models to explore the elevational richness patterns by modelling plot-level species richness separately for forest, shrubland, and grassland plots, with plot area as a covariate. In addition, the elevational patterns of grow-form and life-form composition were also recalculated at the plot level to reduce the influence of differences in plot number and plot size among elevational belts. Importance values were used primarily to identify dominant and co-dominant species within plots and to support vegetation classification, rather than to make direct comparisons of species dominance across vegetation types. Similarly, structural attributes such as community height, community coverage, DBH, and BD are presented as descriptive plot-level variables. Therefore, we have avoided using these variables for broad ecological inference across vegetation types without considering plot size, vegetation type, and sampling design.

***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 classification in this manuscript follows the revised vegetation classification system of China proposed by Guo et al. (2020) and is based on field-observed community physiognomy, vertical structure, constructive and dominant species, and species importance values. The calculation of species importance values and the thresholds used to identify dominant and co-dominant species follow established practices in vegetation survey and classification studies, such as Fang et al. (2009), and therefore provide an explicit and reproducible methodological basis.

Second, based on the 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, as also suggested by Referee #2, we conducted an exploratory TWINSpan analysis based on species composition. As explained in our response to Referee #2, Comment 3, the first-level division was broadly consistent with the major physiognomic contrast in the dataset, whereas finer-level divisions did not fully correspond to the field-based vegetation formations. This result suggests that quantitative classification provides a useful complementary perspective, but does not replace the field-based classification framework used in this data paper. The corresponding revisions in the main manuscript have been presented in our response to Referee #2, Comment 3.

***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. The other two referees have raised the similar question regarding uneven sampling effort, plot-size heterogeneity, and the risk of overinterpreting descriptive patterns. We have therefore reanalyzed and reframed these ecological patterns in the revised manuscript. The detailed methodological revisions are provided in our responses to Referee #1, Comment 3, and Referee #2, Comment 1.

Briefly, we improved the analysis of elevational species richness by accounting for plot-size heterogeneity and by analyzing forest, shrubland, and grassland plots separately. We also recalculated the elevational patterns of growth-form and life-form composition at the plot level to reduce the influence of unequal plot numbers and plot sizes among elevational belts. In addition, we have revised the manuscript throughout to present these results as descriptive summaries of the surveyed plots in the HDM-Plot dataset, rather than as general ecological conclusions for the entire region. The corresponding revisions in the main manuscript have been presented in our response to Referee #1, Comment 3, and Referee #2, Comment 1.