Rubber agroforestry in Thailand provides some biodiversity benefits without reducing yields

Supplementary Information

This supplementary information includes (text, figures, then tables, in sequence as referred to in main text):

Figure S1
Rubber plantation area globally, and in Southeast Asia, 1980 to 2016.

Figure S2
Map of study region showing location of farms in the yield dataset within Phatthalung province, and sampling blocks in the biodiversity dataset in Phatthalung and Songkhla provinces. Letters A – E indicate “districts” that identify spatially clumped sampling blocks.

Figure S3
Monthly rainfall (sum of daily records) and maximum daily temperatures recorded at Hat Yai airport, Songkhla province, Thailand.

Figure S4
Correlation matrix of habitat structural variables across all plots using Pearson correlation, showing a) all variables and b) selected summarised variables

Figure S5
Validation of point-based land-use quantification

Figure S6
Rubber stem density in biodiversity and yield datasets.

Figure S7
Comparison of a) agrodiversity, b) fruit tree stem density and c) timber tree stem density of AF plots between yield and biodiversity datasets.

Figure S8
Variation in species richness among districts, analysed to decide whether to include district as a random effects in models of species richness response.

Figure S9
Influence of rainfall on butterfly species richness, analysed to decide whether to include rainfall as a random effects in models of species richness response.

Figure S10
Influence of sampling trap-days on butterfly species richness, analysed to decide whether to include trap-days as a random effects in models of species richness response.

Figure S11
Comparison of rubber yields in AF and MO plots within soil types
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Comparison of detections of birds, reptiles and butterflies in agroforests and monocultures.

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Correlation between proportion of natural forest in block and density of non-rubber trees in rubber plots.

Figure S16
RDA of butterfly species composition response within AF plots (a-b) and MO plots (c-d) to investigate interaction between plot type and AF:MO ratio in blocks.

Table S1:
Soil types of plots in the yield and biodiversity datasets.

Table S2:
List of non-rubber plant species identified in rubber agroforests.

Table S3:
Species abundances of birds, reptiles and butterflies in AF and MO, IUCN status and habitat specialisation.

Table S4:
Partial Redundancy Analysis (pRDA) assessing species composition response to plot type, after partialling out the effect of block, excluding rare species.

Table S5:
Results of Redundancy Analysis (RDA) of species composition response to the best model of plot type, habitat structure variables and land use composition variables, excluding rare species.
Figure S1:
Rubber plantation area globally, and in Southeast Asia, 1980 to 2016.
Data from (FAO 2018).
Figure S2: Map of study region showing location of farms in the yield dataset within Phatthalung province, and sampling blocks in the biodiversity dataset in Phatthalung and Songkhla provinces. Letters A – E indicate “districts” that identify spatially clumped sampling blocks.
Figure S3:
Monthly rainfall (sum of daily records) and maximum daily temperatures recorded at Hat Yai airport, Songkhla province, Thailand.

Data obtained from the Global Historical Climatology Network database via Climate Data Online (NOAA 2017). Diamonds show 2016 data (the year data for this study was collected; no data available for March), filled points show mean for each month across 2007 – 2016 inclusive, and range lines show minimum and maximum value for each month across 2007 – 2016. Unusually low rainfall and high temperatures were linked to a strong El Niño-Southern Oscillation event (Limsakul & Singhruck 2016).
Field measurements of rubber plot management and vegetation structure were made as follows: stem density and DBH of trees ≥5 cm diameter at breast height (DBH; categorised as rubber, fruit, timber, palm or wild trees) was measured in two 10 m radius subplots 50 m apart, following Barlow et al (2007). Small stems ≥1 m high but ≤ 5 cm DBH were counted within two 5 m radius subplots. Data from subplots were pooled to calculate stem and basal area density of each plot. Understorey density index (0 – 25) was measured by counting how many 10 cm sections of a 2.5 m pole were visible from each subplot centre, when placed 15 m away in each of the four cardinal directions, giving eight points per plot (Barlow et al. 2007). Maximum height (10 cm resolution) and percentage cover (estimated visually) of herbaceous vegetation in 1 m x 1 m quadrats, and percentage canopy cover (measured using a spherical densitometer) were recorded at each of the eight points by one observer (E.W-T). A mean of the eight measurements was then calculated per plot.

All habitat variables were checked for collinearity; those with a Pearson correlation ≥ 0.7, above which collinearity severely distorts model estimation (Dormann et al. 2013), were considered for exclusion from further modelling of biodiversity response. Basal area of each tree type was correlated with its respective stem density, so basal area was excluded from further modelling; stem density is more informative for management recommendations, as basal area will simply increase with time once planting density has been established. Stem density of palms, fruit trees, timber trees and native trees were then combined into a single variable: non-rubber tree stem density (ha-1). Fruit tree stem density was also included as a separate variable, as the food resource provided by fruit trees may have unique effects compared to other tree types; this did not correlate strongly with the stem density of all non-rubber trees (Pearson correlation: 0.33). The pooled number of agroforestry species was included, as this was correlated with the number of specific agroforestry species types. Understory density showed moderate correlation with small stem density (Pearson correlation 0.58) and herb height (Pearson correlation 0.55), so was omitted, and small stem density retained. Herb cover and herb height were strongly correlated (Pearson correlation 0.68), so herb cover was omitted from analysis.
To test the validity of the 39-point land-use classification method, area-based measures of landscape composition were extracted by manually mapping management units using high-resolution Google Earth imagery for a subset of ten blocks. This manual mapping was informed by all available GPS points for each block (mean 139 ± 43 SD per block). The proportion of each block within each land use, as measured using the two methods, was compared per block using a Pearson correlation.
Figure S6:
Rubber stem density in biodiversity and yield datasets.

Panels show rubber stem density of a) all plots, b) AF plots and c) MO plots, showing the ΔAICc of the null model relative to a Generalised Linear Model incorporating plot type (AF and MO). Boxplot format as for Figure S5.

Figure S7:
Comparison of a) agrodiversity, b) fruit tree stem density and c) timber tree stem density of agroforestry plots between yield and biodiversity datasets.

The ΔAICc of the null model, relative to a Generalised Linear Model comparing each variable between the yield and biodiversity datasets, is shown on each panel. All variables were square-root transformed before analysis. Boxplot format as for Figure S5.
Figure S8: Variation in species richness among districts, analysed to decide whether to include district as a random effects in models of species richness response.

Panels show species richness per plot of a) birds, b) reptiles and c) butterflies, with the $\Delta$AICc of the Generalised Linear Model (Poisson distribution, log link function) comparing species richness response to district, relative to a null model, on each panel. A frequentist approach was then used to identify statistically significant pairwise differences ($p \leq 0.05$) between the districts, which are represented by letters above box labels, tested using Tukey’s honestly significant difference. Boxplots show median (central line), upper and lower quartiles (box bounds) and 1.5x inter-quartile range (whiskers). District had an effect on species richness of butterflies, but no effect on birds or reptiles.
Figure S9:
Influence of rainfall on butterfly species richness, analysed to decide whether to include rainfall as a random effect in models of species richness response.

Panels show species richness of a) all plots, b) AF plots and c) MO plots, showing the ΔAICc of the Generalised Linear Model (Poisson distribution, log link function) of the response to rainfall, relative to a null model, on each panel. A frequentist approach was then used to identify statistically significant pairwise differences (p ≤ 0.05) between the levels of rainfall, which are represented by letters above box labels, tested using Tukey’s honestly significant difference. Rainfall had an effect on species richness across all plots and in MO plots, but no effect in AF plots. Boxplot format as for Figure S5.

Figure S10:
Influence of sampling trap-days on butterfly species richness, analysed to decide whether to include trap-days as a random effect in models of species richness response.

Butterfly species richness of a) all plots, b) AF plots and c) MO plots, showing the ΔAICc of a Generalised Linear Model (Poisson distribution, log link function) of response to number of trap-days relative to a null model, with model prediction and 95% CI. The model including trap-days was not better than the null in any case.
Figure S11: Comparison of rubber yields in AF and MO plots within soil types. Rubber yields compared a) between AF and MO within each soil type, including plots with no data, and b) among soil types, within AF and MO.
Figure S12: Habitat structure measures of rubber agroforests (AF) and monocultures (MO) in biodiversity dataset plots.

Boxes bound 25% and 75% quartiles, lines show median, notches give approximate 95% confidence interval around median, diamonds show mean, whiskers extend to 1.5x the interquartile range; outliers are shown as dots. The ∆AICc for each Generalised Linear Model of response to plot type (AF and MO) relative to the null model is shown on each panel. Where the AICc of the plot type model was more than two AICc smaller than that of the null model, an asterisk is shown above the boxplots. The following variables were square-root transformed before analysis: fruit and timber tree species richness, timber, fruit and native tree density, timber tree basal area and density of small stems.
Figure S13:
Sampling completeness of biodiversity surveys.

Panels show a) estimated species richness (mean of Jack1, Jack2, Bootstrap and Mmean, error bars = 95% confidence interval of the mean) and b) percentage of mean estimated species richness observed in samples, compared between AF and MO plots using a Mann-Whitney U test for each taxon; error bars = SD around the mean.

Figure S14:
Comparison of detections of birds, reptiles and butterflies in agroforests and monocultures.

The ΔAICc for each Generalised Linear Model of response to plot type (AF and MO) relative to the null model is shown on each panel.
Figure S15:
Correlation between proportion of natural forest in block and density of non-rubber trees in rubber plots

Linear model and 95% CI shown as fitted line and grey shading; result of Pearson correlation between paired measurements shown on panel.
Figure S16:
RDA of butterfly species composition response within AF plots (a) and MO plots (b).

Excludes rare species.
Table S1: Soil types of plots in the yield and biodiversity datasets

Soil data from the Soil Map of Thailand (2002) is published as part of a comprehensive 1:250,000-scale physical database produced by the Royal Thai Survey Department (RTSD), with soil data provided by the Department of Land Development (DLD), using the US soil classification system (USDA 1999; Department of Land Development 2002). Soil type at the centroid of each plot in each of the yield and biodiversity datasets is shown in the table. The percentage of all plots in loamy/clayey vs skeletal soils, and the percentage of AF vs MO plots in these soils types within each dataset, is shown. Skeletal soils are considered marginal, and may produce lower yields than other soil types (Land Development Department 2014).

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Biodiversity</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AF</td>
<td>MO</td>
</tr>
<tr>
<td><strong>Loamy Paleudults</strong></td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Loamy Paleudults/Clayey Paleaquults</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Loamy Tropudults</strong></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% plots with Loamy/Clayey soils in AF/MO</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>% plots in dataset with Loamy/Clayey soils</td>
<td>22%</td>
<td>53%</td>
</tr>
<tr>
<td><strong>Skeletal Paleudults</strong></td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Skeletal Paleudults/Skeletal Tropudults</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td><strong>Skeletal Tropudults</strong></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Skeletal Tropudults/Loamy Dystroopt</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>% plots with Skeletal soils in AF/MO</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>% plots in dataset with Skeletal soils</td>
<td>78%</td>
<td>47%</td>
</tr>
<tr>
<td><strong>No Data</strong></td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td><strong>Slope Complex</strong></td>
<td>10</td>
<td>7</td>
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</table>
### Table S2:
List of non-rubber plant species identified in rubber agroforests

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name (English)</th>
<th>Common name (Thai)</th>
<th>Type of plant</th>
<th>Part of plant used</th>
<th>Use</th>
<th>IUCN status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Aquilaria crassna</em></td>
<td>Agar Wood; Eagle Wood</td>
<td>กฤษณา</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber/resin for perfume</td>
<td>CR</td>
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<tr>
<td><em>Azadirachta indica</em></td>
<td>Neem</td>
<td>สะเดา</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td></td>
</tr>
<tr>
<td><em>Casuarina equisetifolia</em></td>
<td>-</td>
<td>สน</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td></td>
</tr>
<tr>
<td><em>Cotylelobium lanceolatum</em></td>
<td>-</td>
<td>เกยห้ม</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td>VU</td>
</tr>
<tr>
<td><em>Dalbergia cochinchinensis</em></td>
<td>Siamese Rosewood</td>
<td>พยุง</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td>VU</td>
</tr>
<tr>
<td><em>Dipterocarpus alatus</em></td>
<td>Keruing; Yang</td>
<td>ยางนา</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td>EN</td>
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<tr>
<td><em>Eugenia grandis</em></td>
<td>-</td>
<td>ชะเมา</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td></td>
</tr>
<tr>
<td><em>Hopea odorata</em></td>
<td>Thingan; Merawan</td>
<td>ตะเคียน</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td>VU</td>
</tr>
<tr>
<td><em>Intsia bijuga</em></td>
<td>Borneo Teak; Moluccan Ironwood</td>
<td>หลุมพอ</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td>VU</td>
</tr>
<tr>
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<td>-</td>
<td>หิ่ง</td>
<td>Tree</td>
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<td>Timber</td>
<td></td>
</tr>
<tr>
<td><em>Microcos tomentosa</em></td>
<td>-</td>
<td>ตับพล่า</td>
<td>Tree</td>
<td>Wood</td>
<td>Timber</td>
<td></td>
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<tr>
<td><em>Pterocarpus indicus</em></td>
<td>Burmese Rosewood</td>
<td>ประดู่</td>
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<td>Wood</td>
<td>Timber</td>
<td>VU</td>
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<td>White Meranti</td>
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<td>Timber</td>
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<tr>
<td><em>Swietenia macrophylla</em></td>
<td>Big Leaf Mahogany</td>
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<td>Timber</td>
<td>VU</td>
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<tr>
<td><em>Ternstroemia wallichiana</em></td>
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<td>Wood</td>
<td>Timber</td>
<td>VU</td>
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<tr>
<td><em>Ananas comosus</em></td>
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<td>สับปะรด</td>
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<td>Fruit</td>
<td>Fruit</td>
<td></td>
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<tr>
<td>Scientific name</td>
<td>Common name (English)</td>
<td>Common name (Thai)</td>
<td>Type of plant</td>
<td>Part of plant used</td>
<td>Use</td>
<td>IUCN status</td>
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<tr>
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<td>Fruit</td>
<td>Fruit</td>
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<td>Bouea microphylla</td>
<td>-</td>
<td>มะปริ้ง</td>
<td>Tree</td>
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<td>Fruit</td>
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<td>Lime</td>
<td>มะนาว</td>
<td>Tree</td>
<td>Fruit</td>
<td>Fruit</td>
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<td>มะพร้าว</td>
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<tr>
<td>Ficus sp.</td>
<td>-</td>
<td>มะเดื่อ</td>
<td>Tree</td>
<td>Fruit</td>
<td>Fruit</td>
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<td>Garcinia mangostana</td>
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<td>มังคุด</td>
<td>Tree</td>
<td>Fruit</td>
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<td>Hylocereus undatus</td>
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<td>Salacca zalacca</td>
<td>Snake fruit</td>
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<td>Fruit</td>
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<td>Sandoricum koetjape</td>
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<td>มะขาม</td>
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<td>Anacardium occidentale</td>
<td>Cashew</td>
<td>มะม่วงหิมพานต์</td>
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<td>Fruit + nut</td>
<td>Fruit, nut</td>
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<tr>
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<td>Common name (English)</td>
<td>Common name (Thai)</td>
<td>Type of plant</td>
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<td>Use</td>
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<td>Areca nut</td>
<td>หมาก</td>
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<td>Fruit</td>
<td>Dye</td>
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<td>Bambuseae</td>
<td>Bamboo</td>
<td>ไพ</td>
<td>Grass</td>
<td>Stem</td>
<td>Food, incense, others</td>
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<tr>
<td>Thysanolaena sp.</td>
<td>Tiger grass</td>
<td>หญ้าไม้กวาด</td>
<td>Grass</td>
<td>Stem, seed head</td>
<td>Brooms/brushes</td>
<td></td>
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<tr>
<td>-</td>
<td>-</td>
<td>ชิง</td>
<td>Tree</td>
<td>Leaf</td>
<td>Cigarette paper</td>
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<td>Elateriospermum tapos</td>
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<td>ประ</td>
<td>Tree</td>
<td>Nut</td>
<td>Nut</td>
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<td>Livistona saribus</td>
<td>Taraw Palm</td>
<td>สิเหรง</td>
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<td>Leaf</td>
<td>Roof thatch</td>
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<td>Alpinia conchigera</td>
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<td>Root</td>
<td>Spice</td>
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<td>Cinnamomum iners</td>
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<td>Bean</td>
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<td>ส้มแขก</td>
<td>Tree</td>
<td>Fruit</td>
<td>Vegetable</td>
<td></td>
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<tr>
<td>Garcinia cowa</td>
<td>-</td>
<td>ชะมวง</td>
<td>Tree</td>
<td>Leaf</td>
<td>Vegetable</td>
<td></td>
</tr>
<tr>
<td>Gnetum gnemon</td>
<td>-</td>
<td>ผักเหรียง</td>
<td>Shrub</td>
<td>Leaf</td>
<td>Vegetable</td>
<td>LC</td>
</tr>
<tr>
<td>Parkia speciosa</td>
<td>Stink bean; Bitter bean</td>
<td>สะตอ</td>
<td>Tree</td>
<td>Bean</td>
<td>Vegetable</td>
<td></td>
</tr>
<tr>
<td>Licuala paludosa</td>
<td>Swamp Fan Palm</td>
<td>กะพ้อ</td>
<td>Palm</td>
<td>Leaf</td>
<td>Wrapping sticky rice</td>
<td></td>
</tr>
</tbody>
</table>
Table S3:
Species abundances of birds, reptiles and butterflies in AF and MO, IUCN status and habitat specialisation.

Bird species only include those recorded within 50m of point count location; forest interior specialist and open habitat specialist bird species categorisation based on HBW Alive (del Hoyo et al. 2017); reptile categorisation based on A Field Guide to the Reptiles of Thailand (Chan-ard et al. 2015) and habitat description on the IUCN Red List where available (IUCN 2016). Mean abundances are per plot.

* Non-breeding migratory species

# IUCN Red List status based on species level taxonomic classification, not subspecies

~, Abundance of *Mycalesis* species is for males only; note that presence/absence data was used in most analyses, abundance data is given here only as background.

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>AF Mean abundance (± 95% CI)</th>
<th>MO Mean abundance (± 95% CI)</th>
<th>IUCN</th>
<th>Forest interior specialist</th>
<th>Open habitat specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Abroscopus superciliaris</em></td>
<td>Yellow-bellied Warbler</td>
<td>19.46 ± 9.39</td>
<td>17.8 ± 9.54</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acridotheres grandis</em></td>
<td>Great Myna</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Acridotheres tristis</em></td>
<td>Common Myna</td>
<td>0.08 ± 0.08</td>
<td>-</td>
<td>LC</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Aegithina lafresnayei</em></td>
<td>Great Iora</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aegithina tiphia</em></td>
<td>Common Iora</td>
<td>0.62 ± 0.22</td>
<td>0.52 ± 0.32</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aethopyga siparaja</em></td>
<td>Crimson Sunbird</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Anthreptes malacensis</em></td>
<td>Brown-throated Sunbird</td>
<td>0.18 ± 0.14</td>
<td>0.08 ± 0.11</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Arachnothera longirostra</em></td>
<td>Little Spiderhunter</td>
<td>0.28 ± 0.19</td>
<td>0.20 ± 0.16</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Arachnothera modesta</em></td>
<td>Grey-breasted Spiderhunter</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ardea bacchus</em></td>
<td>Chinese Pond Heron</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Cacomantis merulinus</em></td>
<td>Plaintive Cuckoo</td>
<td>0.10 ± 0.10</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cacomantis sonneratii</em></td>
<td>Banded Bay Cuckoo</td>
<td>0.10 ± 0.10</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Caprimulgus macrurus</em></td>
<td>Large-tailed Nightjar</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Centropus sinensis</em></td>
<td>Greater Coucal</td>
<td>0.26 ± 0.20</td>
<td>0.36 ± 0.25</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chalcoparia singalensis</em></td>
<td>Ruby-cheeked Sunbird</td>
<td>0.03 ± 0.05</td>
<td>0.08 ± 0.16</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chrysococcyx minutillus</em></td>
<td>Little Bronze Cuckoo</td>
<td>0.05 ± 0.07</td>
<td>0.20 ± 0.20</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cinnyris jugularis</em></td>
<td>Olive-backed Sunbird</td>
<td>1.36 ± 0.34</td>
<td>1.32 ± 0.42</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Copsychus saularis</em></td>
<td>Oriental Magpie Robin</td>
<td>0.23 ± 0.15</td>
<td>0.48 ± 0.26</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Corvus macrorhynchos</em></td>
<td>Large-billed Crow</td>
<td>-</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cyornis tickelliae</em></td>
<td>Tickell’s Blue Flycatcher</td>
<td>0.13 ± 0.13</td>
<td>0.08 ± 0.11</td>
<td>LC</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Dendrocopos canicollis</em></td>
<td>Grey-capped Pygmy Woodpecker</td>
<td>0.23 ± 0.15</td>
<td>0.36 ± 0.25</td>
<td>LC</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Dicaeum cruentatum</em></td>
<td>Scarlet-backed Flowerpecker</td>
<td>0.56 ± 0.25</td>
<td>0.40 ± 0.25</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>AF Mean abundance (± 95% CI)</td>
<td>MO Mean abundance (± 95% CI)</td>
<td>IUCN</td>
<td>Forest interior specialist</td>
<td>Open habitat specialist</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>------</td>
<td>---------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Dicaeum trigonostigma</td>
<td>Orange-bellied Flowerpecker</td>
<td>1.92 ± 0.26</td>
<td>1.68 ± 0.27</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dicrurus leucophaeus</td>
<td>Ashy Drongo</td>
<td>-</td>
<td>0.08 ± 0.11</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eudynamys scolopaceus</td>
<td>Asian Koel</td>
<td>0.03 ± 0.05</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Eurystomus ochromalus</td>
<td>Black-and-yellow Broadbill</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ficedula elisae*</td>
<td>Green-backed Flycatcher</td>
<td>-</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ficedula zanthopygia*</td>
<td>Yellow-rumped Flycatcher</td>
<td>0.08 ± 0.08</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geopelia striata</td>
<td>Zebra Dove</td>
<td>0.05 ± 0.07</td>
<td>-</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Gerygone sulphurea</td>
<td>Golden-bellied Gerygone</td>
<td>0.79 ± 0.15</td>
<td>1.04 ± 0.14</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halcyon smyrnensis</td>
<td>White-throated Kingfisher</td>
<td>0.41 ± 0.21</td>
<td>0.40 ± 0.25</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemipus picatus</td>
<td>Bar-winged Flycatcher-shrike</td>
<td>0.10 ± 0.12</td>
<td>0.16 ± 0.24</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothymis azurea</td>
<td>Black-naped Monarch</td>
<td>0.05 ± 0.10</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leptocoma brasiliana</td>
<td>Van Hasselt’s Sunbird</td>
<td>0.13 ± 0.13</td>
<td>0.08 ± 0.11</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loriculus galgulus</td>
<td>Blue-crowned Hanging Parrot</td>
<td>0.05 ± 0.07</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macronus gularis</td>
<td>Pin-striped Tit Babbler</td>
<td>0.79 ± 0.44</td>
<td>0.40 ± 0.32</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malacocincla abbotti</td>
<td>Abbott’s Babbler</td>
<td>0.18 ± 0.14</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Megalaima lineata</td>
<td>Lineated Barbet</td>
<td>0.26 ± 0.16</td>
<td>0.16 ± 0.19</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Megalaima mystacophanos</td>
<td>Red-throated Barbet</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merops philippinus*</td>
<td>Blue-tailed Bee-eater</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Merops viridis</td>
<td>Blue-throated Bee-eater</td>
<td>0.08 ± 0.11</td>
<td>-</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Microptera brachyurus</td>
<td>Rufous Woodpecker</td>
<td>0.08 ± 0.15</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscicapa daurica*</td>
<td>Asian Brown Flycatcher</td>
<td>0.03 ± 0.05</td>
<td>0.20 ± 0.16</td>
<td>LC</td>
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<td></td>
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<tr>
<td>Orthotomus atrogularis</td>
<td>Dark-necked Tailorbird</td>
<td>0.85 ± 0.28</td>
<td>0.20 ± 0.16</td>
<td>LC</td>
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<td></td>
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<tr>
<td>Orthotomus sutorius</td>
<td>Common Tailorbird</td>
<td>1.54 ± 0.30</td>
<td>1.20 ± 0.49</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pachycephala cinerea</td>
<td>Mangrove Whistler</td>
<td>0.10 ± 0.12</td>
<td>0.28 ± 0.21</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelloremon ruficeps</td>
<td>Puff-throated Babbler</td>
<td>1.46 ± 0.39</td>
<td>1.28 ± 0.47</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pericrocotus divaricatus*</td>
<td>Ashy Minivet</td>
<td>0.08 ± 0.08</td>
<td>0.16 ± 0.15</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Phaenicophaeus tristis</td>
<td>Green-billed Malkoha</td>
<td>0.05 ± 0.07</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phylloscopus borealis*</td>
<td>Arctic Warbler</td>
<td>0.21 ± 0.13</td>
<td>0.24 ± 0.17</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Picus puniceus</td>
<td>Crimson-winged Woodpecker</td>
<td>0.05 ± 0.07</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pitta moluccensis</td>
<td>Blue-winged Pitta</td>
<td>0.15 ± 0.11</td>
<td>0.16 ± 0.15</td>
<td>LC</td>
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</tr>
<tr>
<td>Prinia rufescens</td>
<td>Rufescent Prinia</td>
<td>1.82 ± 0.39</td>
<td>2.52 ± 0.57</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Prionochilus maculatus</td>
<td>Yellow-breasted Flowerpecker</td>
<td>0.23 ± 0.20</td>
<td>0.20 ± 0.16</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prionochilus percussus</td>
<td>Crimson-breasted Flowerpecker</td>
<td>0.08 ± 0.11</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psilopogon duvaucelii</td>
<td>Black-eared Barbet</td>
<td>0.05 ± 0.07</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pycnonotus atriceps</td>
<td>Black-headed Bulbul</td>
<td>1.00 ± 0.31</td>
<td>1.00 ± 0.45</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pycnonotus blanfordi</td>
<td>Streak-eared Bulbul</td>
<td>0.08 ± 0.11</td>
<td>0.08 ± 0.16</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Pycnonotus brunneus</td>
<td>Asian Red-eyed Bulbul</td>
<td>0.21 ± 0.19</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>AF Mean abundance (± 95% CI)</td>
<td>MO Mean abundance (± 95% CI)</td>
<td>IUCN</td>
<td>Forest interior specialist</td>
<td>Open habitat specialist</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>-------------------------------</td>
<td>------</td>
<td>----------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><em>Pycnonotus finlaysoni</em></td>
<td>Stripe-throated Bulbul</td>
<td>0.79 ± 0.27</td>
<td>0.80 ± 0.28</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Pycnonotus goiavier</em></td>
<td>Yellow-vented Bulbul</td>
<td>0.10 ± 0.10</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Pycnonotus plumosus</em></td>
<td>Olive-winged Bulbul</td>
<td>0.64 ± 0.29</td>
<td>0.52 ± 0.28</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sasia abnormis</em></td>
<td>Rufous Piculet</td>
<td>0.03 ± 0.05</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Spilopelia chinensis</em></td>
<td>Spotted Dove</td>
<td>0.03 ± 0.05</td>
<td>0.12 ± 0.13</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Surniculus lugubris</em></td>
<td>Asian Dongo Cuckoo</td>
<td>0.05 ± 0.07</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tephrodornis virgatus</em></td>
<td>Large Woodshrike</td>
<td>0.21 ± 0.40</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Terpsiphone paradisi</em></td>
<td>Asian Paradise-flycatcher</td>
<td>0.13 ± 0.13</td>
<td>0.08 ± 0.11</td>
<td>LC</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Todiramphus chloris</em></td>
<td>Collared Kingfisher</td>
<td>-</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td><em>Zosterops everetti</em></td>
<td>Everett’s White-eye</td>
<td>0.08 ± 0.15</td>
<td>0.16 ± 0.31</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reptiles</strong></td>
<td></td>
<td><strong>7.90 ± 3.03</strong></td>
<td><strong>9.83 ± 4.43</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ahaetulla prasina</em></td>
<td>Asian Vine Snake</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Calotes emma</em></td>
<td>Emma Gray’s Forest Lizard</td>
<td>1.08 ± 0.49</td>
<td>0.75 ± 0.49</td>
<td>NA</td>
<td>x</td>
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</tr>
<tr>
<td><em>Calotes versicolor</em></td>
<td>Oriental Garden Lizard</td>
<td>2.10 ± 0.50</td>
<td>2.88 ± 0.74</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dendrelaphis pictus</em></td>
<td>Painted Bronzeback</td>
<td>0.03 ± 0.05</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Draco blandfordii</em></td>
<td>Blandford’s Gliding Lizard</td>
<td>-</td>
<td>0.13 ± 0.25</td>
<td>NA</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Draco maculatus</em></td>
<td>Spotted Gliding Lizard</td>
<td>0.49 ± 0.27</td>
<td>0.50 ± 0.29</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Draco sumatranus</em></td>
<td>Common Gliding Lizard</td>
<td>0.51 ± 0.25</td>
<td>0.71 ± 0.38</td>
<td>NA</td>
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<td></td>
</tr>
<tr>
<td><em>Eutropis macularia</em></td>
<td>Bronze Grass Skink</td>
<td>2.13 ± 0.52</td>
<td>2.83 ± 0.66</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Eutropis multifasciata</em></td>
<td>Common Sun Skink</td>
<td>0.31 ± 0.15</td>
<td>0.38 ± 0.23</td>
<td>NA</td>
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</tr>
<tr>
<td><em>Hemidactylus frenatus</em></td>
<td>Common House Gecko</td>
<td>0.18 ± 0.12</td>
<td>0.21 ± 0.17</td>
<td>LC</td>
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<td></td>
</tr>
<tr>
<td><em>Hemidactylus platyurus</em></td>
<td>Flat-Tailed House Gecko</td>
<td>0.05 ± 0.07</td>
<td>0.08 ± 0.11</td>
<td>NA</td>
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<tr>
<td><em>Lygosoma bowringii</em></td>
<td>Bowring’s Supple Skink</td>
<td>0.79 ± 0.30</td>
<td>1.04 ± 0.63</td>
<td>NA</td>
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<tr>
<td><em>Lygosoma quadrupes</em></td>
<td>Short-Limbed Supple Skink</td>
<td>0.05 ± 0.07</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Naja kaouthia</em></td>
<td>Monocled Cobra</td>
<td>-</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
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<tr>
<td><em>Ptyas korros</em></td>
<td>Indochinese Rat Snake</td>
<td>0.08 ± 0.08</td>
<td>0.17 ± 0.15</td>
<td>NA</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td><em>Takydromus sexlineatus</em></td>
<td>Asian Grass Lizard</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>LC</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td><strong>Butterflies</strong></td>
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<td><strong>15.38 ± 3.32</strong></td>
<td><strong>8.70 ± 4.52</strong></td>
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<tr>
<td><em>Amathusia masina</em></td>
<td>The Rusty Palmking</td>
<td>0.18 ± 0.19</td>
<td>0.12 ± 0.17</td>
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<td><em>Ariadne ariadne pallidior</em></td>
<td>The Angled Castor</td>
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<td>0.12 ± 0.17</td>
<td>NA</td>
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<tr>
<td><em>Athyma larymna siamensis</em></td>
<td>The Great Siam Sergeant</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
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<tr>
<td><em>Athyma perius perius</em></td>
<td>The Common Sergeant</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
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</tr>
<tr>
<td><em>Charaxes athama</em></td>
<td>The Common Nawab</td>
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<td>0.04 ± 0.08</td>
<td>NA</td>
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</tr>
<tr>
<td><em>Charaxes bernardus crepax</em></td>
<td>The Common Tawny Rajah</td>
<td>0.08 ± 0.08</td>
<td>-</td>
<td>NA</td>
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<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>AF Mean abundance (± 95% CI)</td>
<td>MO Mean abundance (± 95% CI)</td>
<td>IUCN</td>
<td>Forest interior specialist</td>
<td>Open habitat specialist</td>
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<tr>
<td><strong>Charaxes hebe chersonesus</strong></td>
<td>The Southern Nawab</td>
<td>0.08 ± 0.08</td>
<td>-</td>
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</tr>
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<td><strong>Charaxes moori moori</strong></td>
<td>The Malayan Yellow Nawab</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
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<td><strong>Coelites epiminthia epiminthia</strong></td>
<td>The Straight Banded Catseye</td>
<td>-</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
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<td><strong>Discophora sondaica despoliata</strong></td>
<td>The Common Duffer</td>
<td>0.08 ± 0.08</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
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<tr>
<td><strong>Elymnias hypermnestra tinctoria</strong></td>
<td>The Common Palmfly</td>
<td>0.13 ± 0.13</td>
<td>0.12 ± 0.13</td>
<td>NA</td>
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</tr>
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<td><strong>Elymnias nesaea lioneli</strong></td>
<td>The Tiger Palmfly</td>
<td>0.05 ± 0.07</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
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</tr>
<tr>
<td><strong>Euthalia aconthea gurda</strong></td>
<td>The Mango Baron</td>
<td>0.05 ± 0.07</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
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<td></td>
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<tr>
<td><strong>Euthalia alphea yamuna</strong></td>
<td>The Streaked Baron</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Euthalia djata siamica</strong></td>
<td>The Red Spot Baron</td>
<td>-</td>
<td>0.04 ± 0.08</td>
<td>LC</td>
<td></td>
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<tr>
<td><strong>Euthalia evelina compta</strong></td>
<td>The Red Spot Duke</td>
<td>0.51 ± 0.33</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td><strong>Euthalia malaccana malaccana</strong></td>
<td>The Malay Red Baron</td>
<td>0.08 ± 0.11</td>
<td>0.08 ± 0.11</td>
<td>LC</td>
<td></td>
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<tr>
<td><strong>Euthalia monina monina</strong></td>
<td>The Malay Baron</td>
<td>0.03 ± 0.05</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Euthalia recta montilis</strong></td>
<td>The Red Spot Marquis</td>
<td>0.33 ± 0.35</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Euthalia teuta</strong></td>
<td>The Banded Marquis</td>
<td>0.62 ± 0.45</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Herona marathus angustata</strong></td>
<td>The Yellow Pasha</td>
<td>0.08 ± 0.08</td>
<td>-</td>
<td>NA</td>
<td></td>
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<tr>
<td><strong>Hypolimnas bolina jacintha</strong></td>
<td>The Great Eggfly</td>
<td>0.36 ± 0.29</td>
<td>0.08 ± 0.11</td>
<td>NA</td>
<td></td>
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<tr>
<td><strong>Junonia atlites atlites</strong></td>
<td>The Grey Pansy</td>
<td>0.03 ± 0.05</td>
<td>0.08 ± 0.11</td>
<td>NA</td>
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<tr>
<td><strong>Junonia iphita iphita</strong></td>
<td>The Chocolate Pansy</td>
<td>0.21 ± 0.18</td>
<td>0.16 ± 0.19</td>
<td>NA</td>
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</tr>
<tr>
<td><strong>Lebadea martha malayana</strong></td>
<td>The Knight</td>
<td>0.05 ± 0.07</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lexias pardalis dirteana</strong></td>
<td>The Common Archduke</td>
<td>0.05 ± 0.07</td>
<td>-</td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td><strong>Melanitis leda leda</strong></td>
<td>The Common Evening Brown</td>
<td>3.56 ± 0.94</td>
<td>2.04 ± 1.13</td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td><strong>Melanitis phedima abdullae</strong></td>
<td>The Dark Evening Brown</td>
<td>0.15 ± 0.21</td>
<td>-</td>
<td>NA</td>
<td></td>
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</tr>
<tr>
<td><strong>Moduza procris milonia</strong></td>
<td>The Common Commander</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mycalesis distanti-intermedia</strong></td>
<td>Bushbrown</td>
<td>3.90 ± 1.23</td>
<td>2.38 ± 1.45</td>
<td>-</td>
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<tr>
<td><strong>Mycalesis mineus</strong></td>
<td>The Dark Branded Bushbrown</td>
<td>0.97 ± 0.47</td>
<td>0.96 ± 0.70</td>
<td>-</td>
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</tr>
<tr>
<td><strong>Mycalesis perseoides</strong></td>
<td>The Burmese Bushbrown</td>
<td>1.08 ± 0.78</td>
<td>0.79 ± 0.53</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mycalesis visala phamis</strong></td>
<td>The Long-Branded Bushbrown</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neptis hylas papaja</strong></td>
<td>The Common Sailor</td>
<td>-</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rhinopalpa polynice eudoxia</strong></td>
<td>The Wizard</td>
<td>0.05 ± 0.10</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tanaecia clathrata violaria</strong></td>
<td>The Violet-Bordered Viscount</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tanaecia flora andersonii</strong></td>
<td>The Blue Count</td>
<td>0.18 ± 0.14</td>
<td>0.20 ± 0.25</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>AF Mean abundance (± 95% CI)</td>
<td>MO Mean abundance (± 95% CI)</td>
<td>IUCN</td>
<td>Forest interior specialist</td>
<td>Open habitat specialist</td>
</tr>
<tr>
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</tr>
<tr>
<td><em>Tanaecia iapis pusea</em></td>
<td>The Horsfield’s Baron</td>
<td>0.18 ± 0.14</td>
<td>0.04 ± 0.08</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tanaecia julii</em></td>
<td>The Common Earl</td>
<td>1.36 ± 0.55</td>
<td>0.72 ± 0.67</td>
<td>NA</td>
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<td></td>
</tr>
<tr>
<td><em>Tanaecia pelea pelea</em></td>
<td>The Malay Viscount</td>
<td>0.23 ± 0.20</td>
<td>-</td>
<td>LC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Telinga janardana</em></td>
<td>The Lesser Bushbrown</td>
<td>0.92 ± 0.41</td>
<td>0.48 ± 0.41</td>
<td>LC</td>
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</tr>
<tr>
<td><em>Ypthima baldus newboldi</em></td>
<td>The Common Fivering</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ypthima nebulosa</em></td>
<td>The Malayan Fivering</td>
<td>0.05 ± 0.07</td>
<td>0.08 ± 0.11</td>
<td>NA</td>
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<td></td>
</tr>
<tr>
<td><em>Zeuxidia amethystus amethystus</em></td>
<td>The Common Saturn</td>
<td>0.03 ± 0.05</td>
<td>-</td>
<td>NA</td>
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</table>
Table S4:
Partial Redundancy Analysis (pRDA) assessing species composition response to plot type (agroforest AF, monoculture MO), after partialling out the effect of block, excluding rare species.

Variance, F and p values are reported for the whole model which contained plot type as the only environmental variable, and Block as a conditioning variable. Species abundance was scaled before analysis, so inertia is equivalent to the number of species in the ordination.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Df</th>
<th>Variance</th>
<th>F</th>
<th>Pr (&gt;F)</th>
<th>Inertia</th>
<th>Proportion inertia explained</th>
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<tbody>
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<td><strong>Birds</strong></td>
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<tr>
<td>Total</td>
<td></td>
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<td>47</td>
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<td>Conditional (Block)</td>
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<td>21.45</td>
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<td>0.66</td>
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<td>24.89</td>
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<td>Total</td>
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<td><strong>Butterflies</strong></td>
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Table S5:
Results of Redundancy Analysis (RDA) of species composition response to the best model of plot type, rubber plot management variables and landscape composition variables, excluding rare species.

Variance, F and p values are for sequential addition of terms into the model. Variance Inflation Factor was <10 for all terms in all models, and thus terms can be considered non-collinear, and the order of inclusion in the model unimportant. Analysis excludes rare species (total abundance or sum of presences less than three). Species abundance was scaled before analysis, so inertia is equivalent to the number of species in the ordination.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Df</th>
<th>Variance</th>
<th>Pseudo-F</th>
<th>Pr (&gt;F)</th>
<th>Inertia</th>
<th>Proportion inertia explained</th>
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<td>RDA1</td>
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<td>3.20</td>
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<td>2.19</td>
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<td>1.76</td>
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<td>Non-rubber tree stem density (stems ha⁻¹)</td>
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<td>1.20</td>
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<td>Proportion rubber (%)</td>
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<td>1.47</td>
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<td>Proportion natural forest (%)</td>
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<tr>
<td>Proportion open habitat (%)</td>
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<td>Reptiles</td>
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