Supplemental Information:

Termites can decompose more than half of deadwood in tropical rainforest

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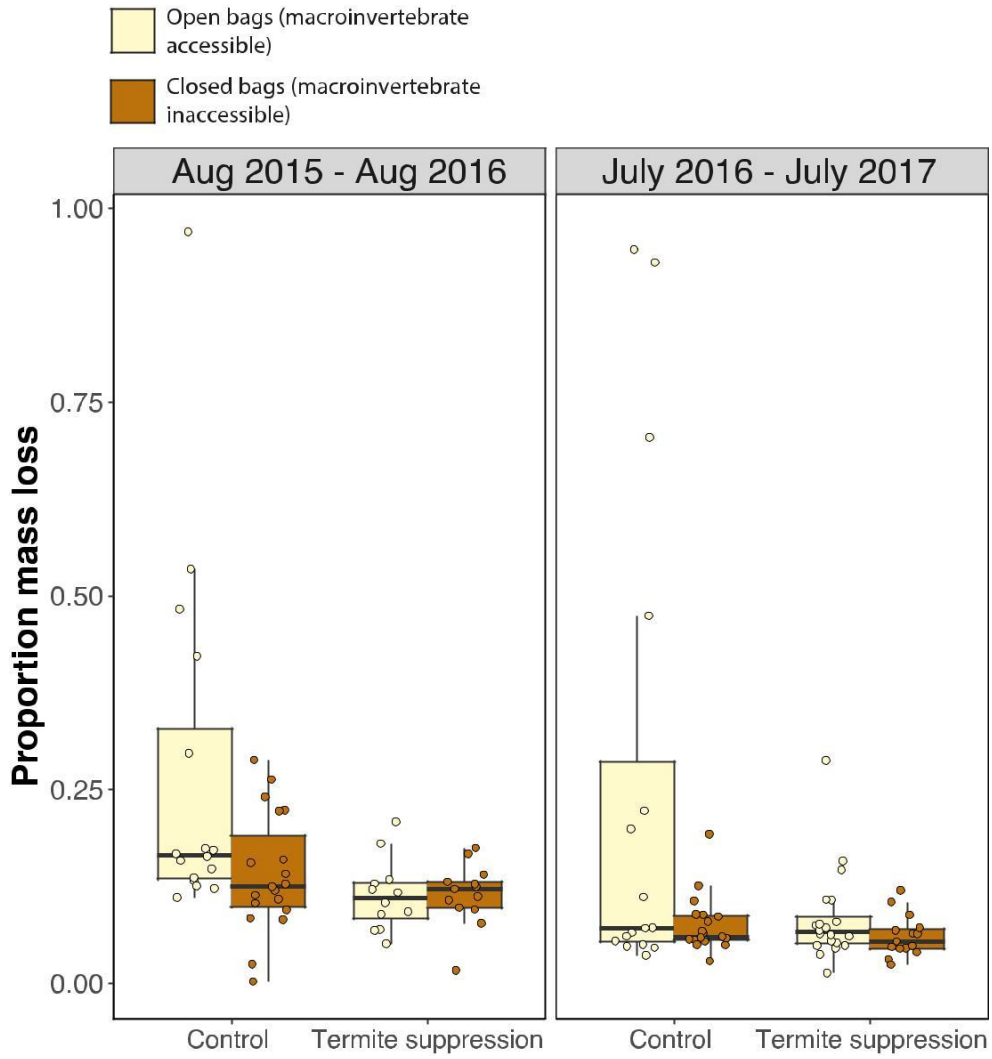

Figure S1. The median plus interquartile range mass lost from macroinvertebrate accessible (yellow bars) or macroinvertebrate inaccessible (brown bars) wood blocks within control and termite suppression plots. Raw data is displayed over the boxes to show variability in mass loss. Left panel: wood blocks left in the forest for 12 months between August 2015 and August 2016, right panel: wood blocks left for 12 months between July 16 and July 17.

Treatment comparison	Estimate	Std. Error	z-value	P
a) Aug 15 – Aug 16				
Termite supp. open - Control open	**-1.055**	**0.391**	**-2.7**	**0.03**
Control closed - Control open	**-1.006**	**0.347**	**-2.9**	**0.02**
Termite supp. closed - Control open	**-1.073**	**0.382**	**-2.81**	**0.03**
Control closed - Termite supp. open	-0.048	0.377	0.13	1
Termite closed - Termite open	-0.018	0.409	-0.04	1
Termite closed - Control closed	-0.066	0.368	-0.18	1
b) July 16 – July 17				
Termite supp. open - Control open	**-1.073**	**0.359**	**-2.98**	**0.015**
Control closed - Control open	**-1.087**	**0.364**	**-2.99**	**0.015**
Termite supp. closed - Control open	**-1.310**	**0.385**	**-3.4**	**0.004**
Control closed - Termite supp. open	-0.014	0.343	-0.04	1
Termite closed - Termite open	-0.236	0.366	-0.65	1
Termite closed - Control closed	-0.222	0.370	-0.6	1

Table S1 Lmer model outputs testing the effects of plot treatment (control versus termite suppression) and bag treatment (open versus closed) on wood block mass loss from decomposition bags between August 2015 and August 2016 (a) and between July 2016 and July 2017 (b). Significant differences between the treatment levels were assessed using pairwise mean comparisons (Tukey's posthoc tests) from the glht function in the 'multcomp' package in R.

Supplemental Experimental Procedures

Termite suppression plots were established in October 2014 and maintained for a period of 2 years and 9 months. On the termite suppression plots we added 15 m buffer zones, so the total area treated with insecticide was 80 x 80 m. In order to avoid any edge effects, sampling occurred only within core 50 x 50 m plots. We took an integrated pest management approach to suppress the activity of wood-feeding termites on our plots. All termite mounds within the 80 x 80 m termite treatment plots were physically removed and 23ppm imidacloprid solution was applied to the mound locations. On 6 occasions across the suppression period, we targeted wood-feeding termites by placing 289 half toilet paper rolls, treated with 5.7ppm fipronil solution across the plots. On two occasions in the first year of the suppression, we also applied tea bags treated with the same solution. Termite activity was regularly monitored using non-poisoned toilet paper rolls. Untreated TPRs were placed on each plot and were scored for termite attack on a 0 to 5 scale, where 0 is untouched and 5 is completely eaten. After one month, TPR were scored and replaced. Before they were replaced, we recorded the cumulative amount of TPR consumed on each plot and calculated the plot-level cumulative mean attack scores. Using the mean scores from each monitoring event, we calculated a slope for the control and treatment line (using a regression through the origin in each case). From this we estimated consumption rate per month, which was 0.87 units of TPR per month in the control and 0.48 units per month in the treatment. This is the equivalent of 22% toilet roll consumption per month for control plots and 12% per month in the termite suppression plots. This amounts to a steady suppression of activity of 45% (Random slopes lmer with [time | plot] specified as the random factor, on square-root transformed data: LRT = 20.76, $P < 0.001$; and see [S1]). We also assessed termite community composition, using the Jones and Eggleton transect method [S2] in June 2015 and October 2016 and found a consistent, significant turnover in termite assemblage structure on the termite suppression plots in both years (Monte Carlo permutation test: pseudoF = 23.6, $P = 0.001$, primarily driven by a reduction in wood-feeding *Macrotermes*, *Bulbitermes* and *Schedorhinotermes* [S1]. On the control plots, the termite

assemblage was characteristic of those found across the Sunda region, which are generally dominated by *Macrotermes* [S3].

We also tested for non-target effects by sampling leaf litter invertebrates, soil and leaf samples across the termite suppression and control plots. We found no evidence of any effect of the suppression experiment on non-termite invertebrate groups, nor did we detect any fipronil or imidacloprid in soil or leaf litter samples taken from the plots. For full details of non-target effects see [S1].

Decomposition assays

The relative contributions of termites, other invertebrates and microbes were assessed using 9 x 9 x 5 cm wood blocks (untreated *Pinus radiata),* each block weighing bag 174 ± 19 g. Wood blocks were dried at 60ºC until they reached a constant weight and placed inside "open" or "closed" bags, which were all made with 300-micron nylon mesh (Plastok™, Merseyside, UK), to avoid confounding "mesh effects" [S4]. Nylon (polyamide), is mostly resistant to termite damage [S5]. The edges of the closed bags were folded several times and sealed with staples to prevent access by invertebrates. On each plot, 5 open and 5 closed wood blocks were placed in a grid, at least 10 m apart. When placing the woodblocks on the plots, the top layer of leaf litter was removed, and the blocks were placed directly on the humus layer. Wood blocks were left on the plots for 2, 12-month periods (Aug 2015 – Aug 2016 and July 2016 – July 2016). Upon collection, the wood blocks were again dried at 60ºC until they reached a constant weight. Once dried, wood material was separated from termite carton material and soil. The remaining dead wood was then re-weighed and the relative proportion of mass loss was calculated. The interaction between plot treatment (termite suppression vs. control) and bag treatment (open vs. closed) was first tested using lmers on logit transformed proportion data for each year separately. This revealed a significant and consistent effect of the interaction between plot and bag treatment in both years [Figure S1 and Table S1]. Therefore, the data for each year were pooled and tested again using an lmer random slopes model (year | plot was specified as a random factor) on logit transformed data.

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Data accessibility

Data have been deposited in the NERC Environmental Information Data Centre: https://doi.org/10.5285/01034680-e640-44a2-aab6-2044b4672a95

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