Chisholm, Ryan A.; Muller-Landau, Helene C.; Rahman, Kassim Abdul; Bebber, Daniel P.; Bin, Yue; Bohlman, Stephanie A.; Bourg, Norman A.; Brinks, Joshua; Bunyavejchewin, Sarayudh; Butt, Nathalie; Cao, Honglin; Cao, Min; Cárdenas, Dairon; Chang, Li-Wan; Chiang, Jyh-Min; Chuyong, George; Condit, Richard; Dattaraja, Handanakere S.; Davies, Stuart; Duque, Alvaro; Fletcher, Christine; Gunatilleke, Nimal; Gunatilleke, Savitri; Hao, Zhanqing; Harrison, Rhett D.; Howe, Robert; Hsieh, Chang-Fu; Hubbell, Stephen P.; Itoh, Akira; Kenfack, David; Kiratiprayoon, Somboon; Larson, Andrew J.; Lian, Juyu; Lin, Dunmei; Liu, Haifeng; Lutz, James A.; Ma, Keping; Malhi, Yadvinder; McMahon, Sean; McShea, William; Meegaskumbura, Madhava; Razman, Salim Mohd.; Morecroft, Michael D.; Nytch, Christopher J.; Oliveira, Alexandre; Parker, Geoffrey G.; Pulla, Sandeep; Punchi-Manage, Ruwan; Romero-Saltos, Hugo; Sang, Weiguo; Schurman, Jon; Su, Sheng-Hsin; Sukumar, Raman; Sun, I-Fang; Suresh, Hebbalalu S.; Tan, Sylvester; Thomas, Duncan; Thomas, Sean; Thompson, Jill; Valencia, Renato; Wolf, Amy; Yap, Sandra; Ye, Wanhui; Yuan, Zuoqiang; Zimmerman, Jess K.. 2013. **Scale-dependent relationships between tree species richness and ecosystem function in forests.** *Journal of Ecology*, 101 (5). 1214-1224. https://doi.org/10.1111/1365-2745.12132

Appendix S1 *Supplementary graphs and tables*

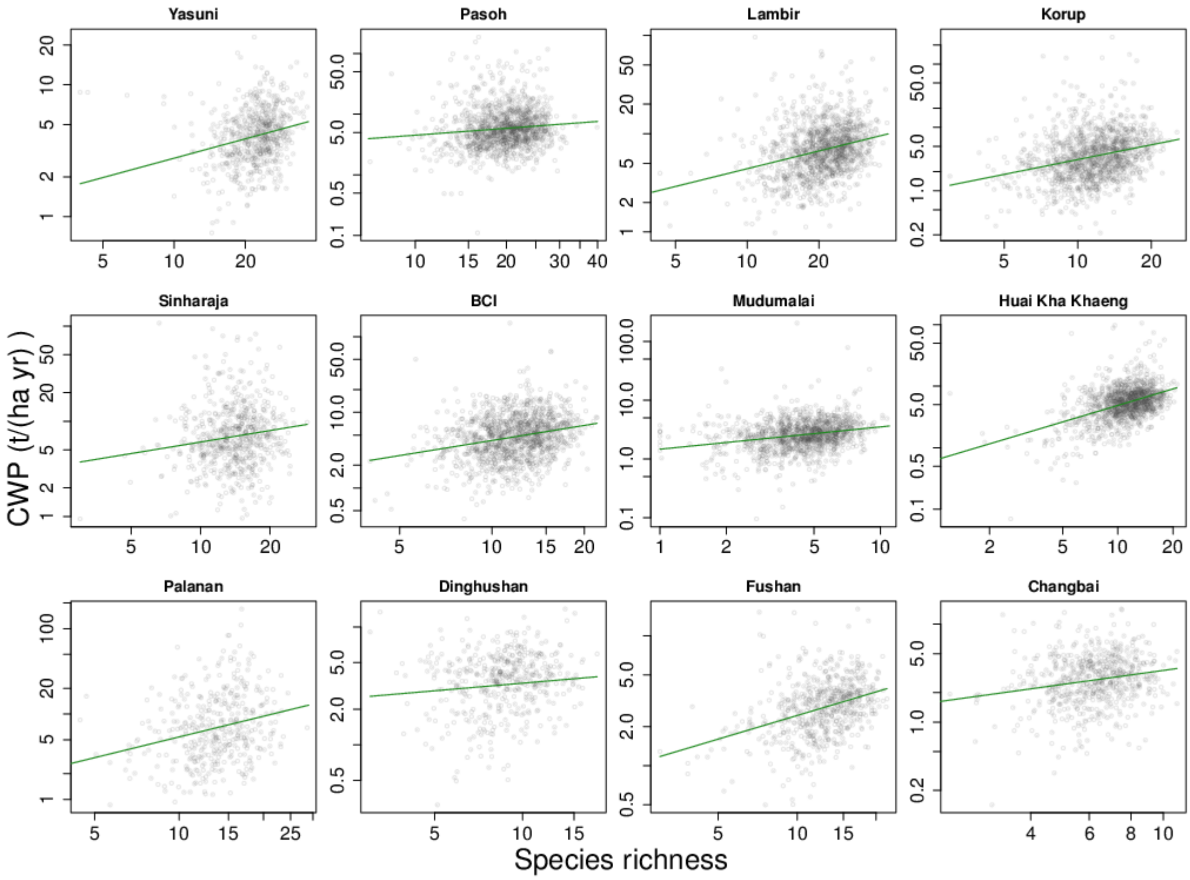

Fig. S1. Observed relationships between species richness and coarse woody productivity (CWP) at the study sites at the 0.04 ha spatial scale.

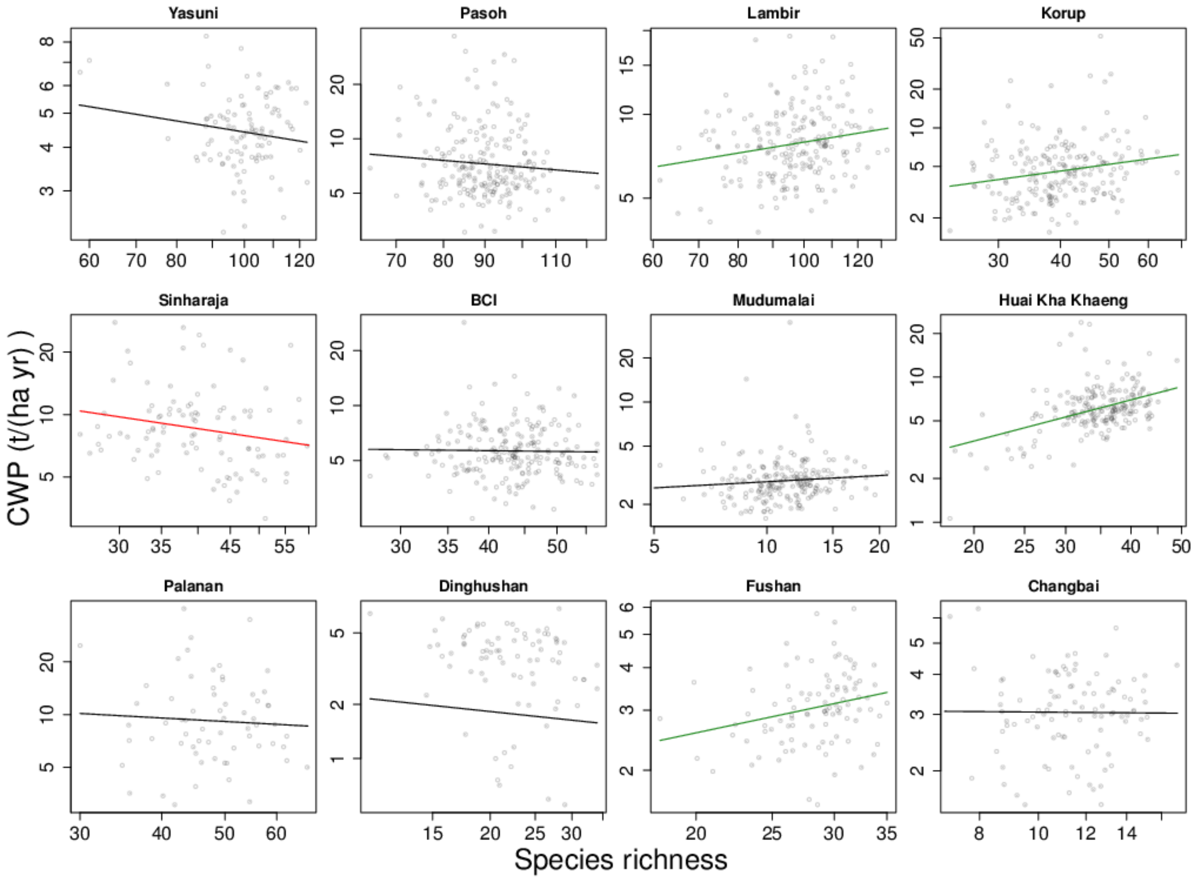

Fig. S2. Observed relationships between species richness and coarse woody productivity (CWP) at the study sites at the 0.25 ha spatial scale.

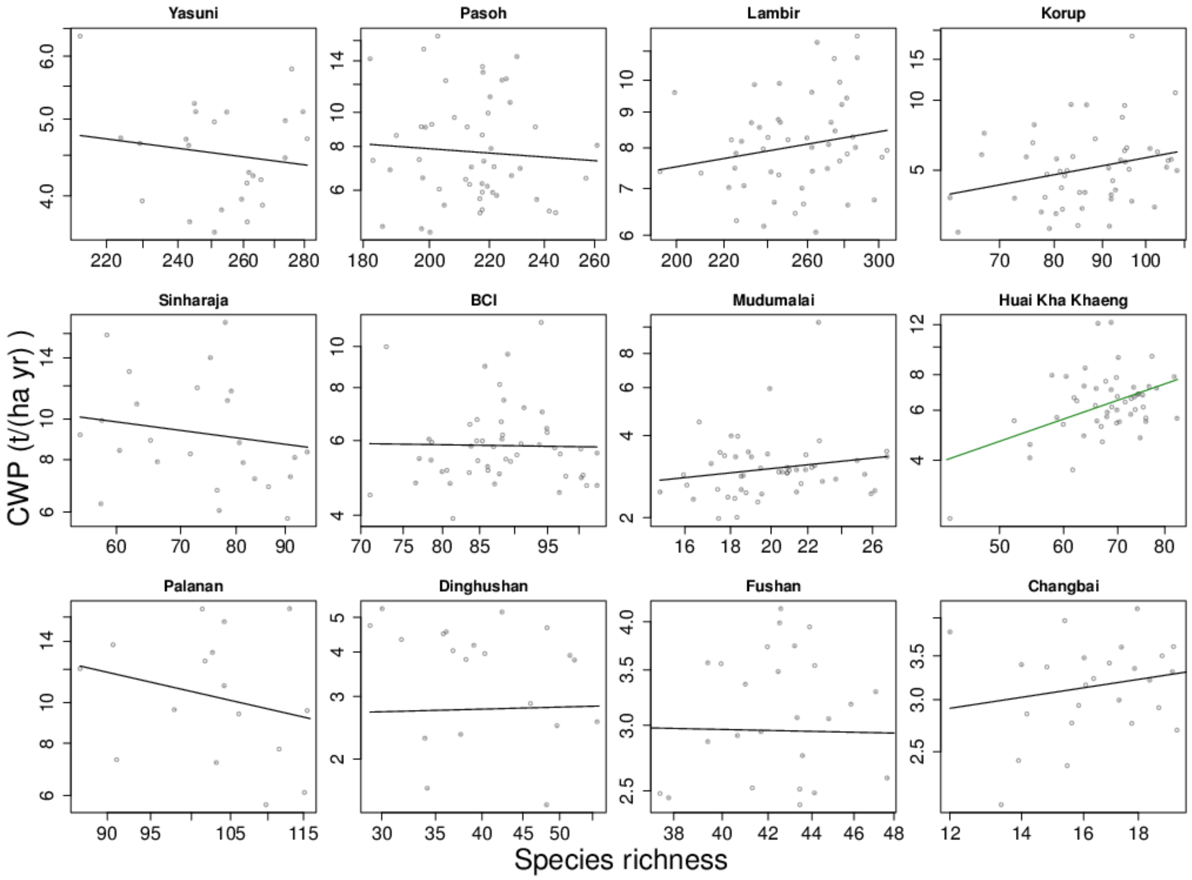

Fig. S3. Observed relationships between species richness and coarse woody productivity (CWP) at the study sites at the 1.0 ha spatial scale.

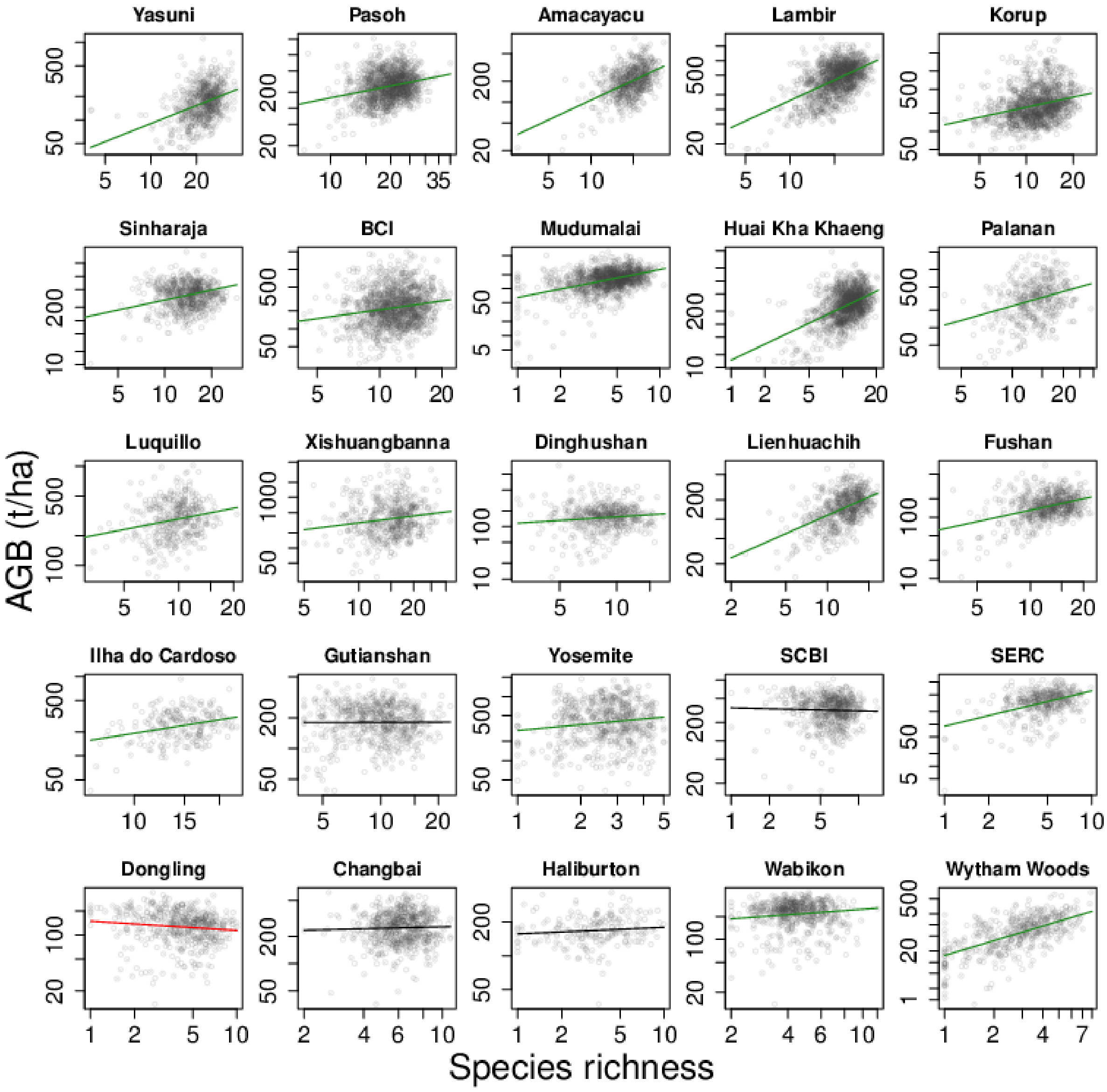

Fig. S4. Observed relationships between species richness and aboveground biomass (AGB) at the study sites at the 0.04 ha spatial scale.

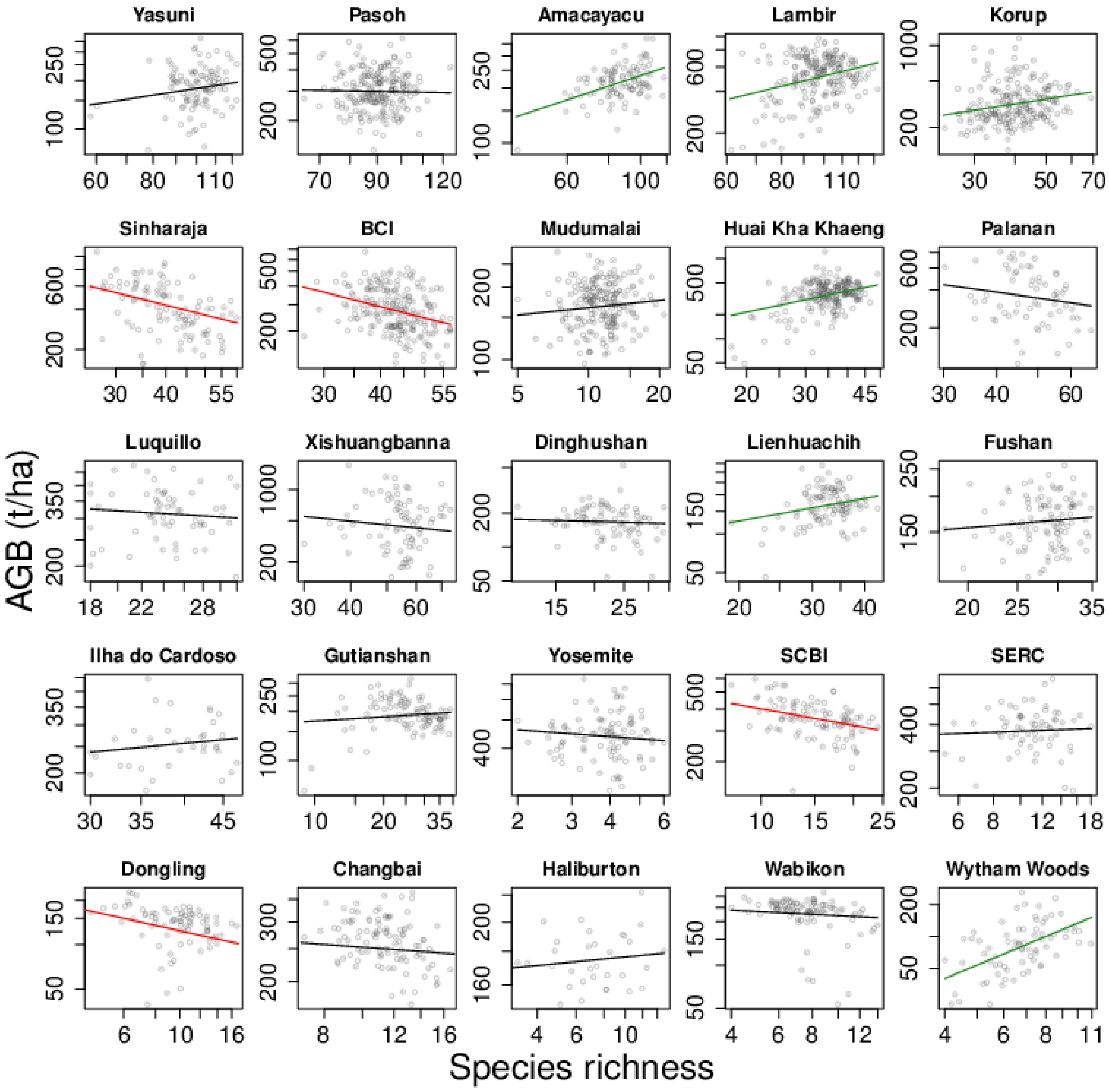

Fig. S5. Observed relationships between species richness and aboveground biomass (AGB) at the study sites at the 0.25 ha spatial scale.

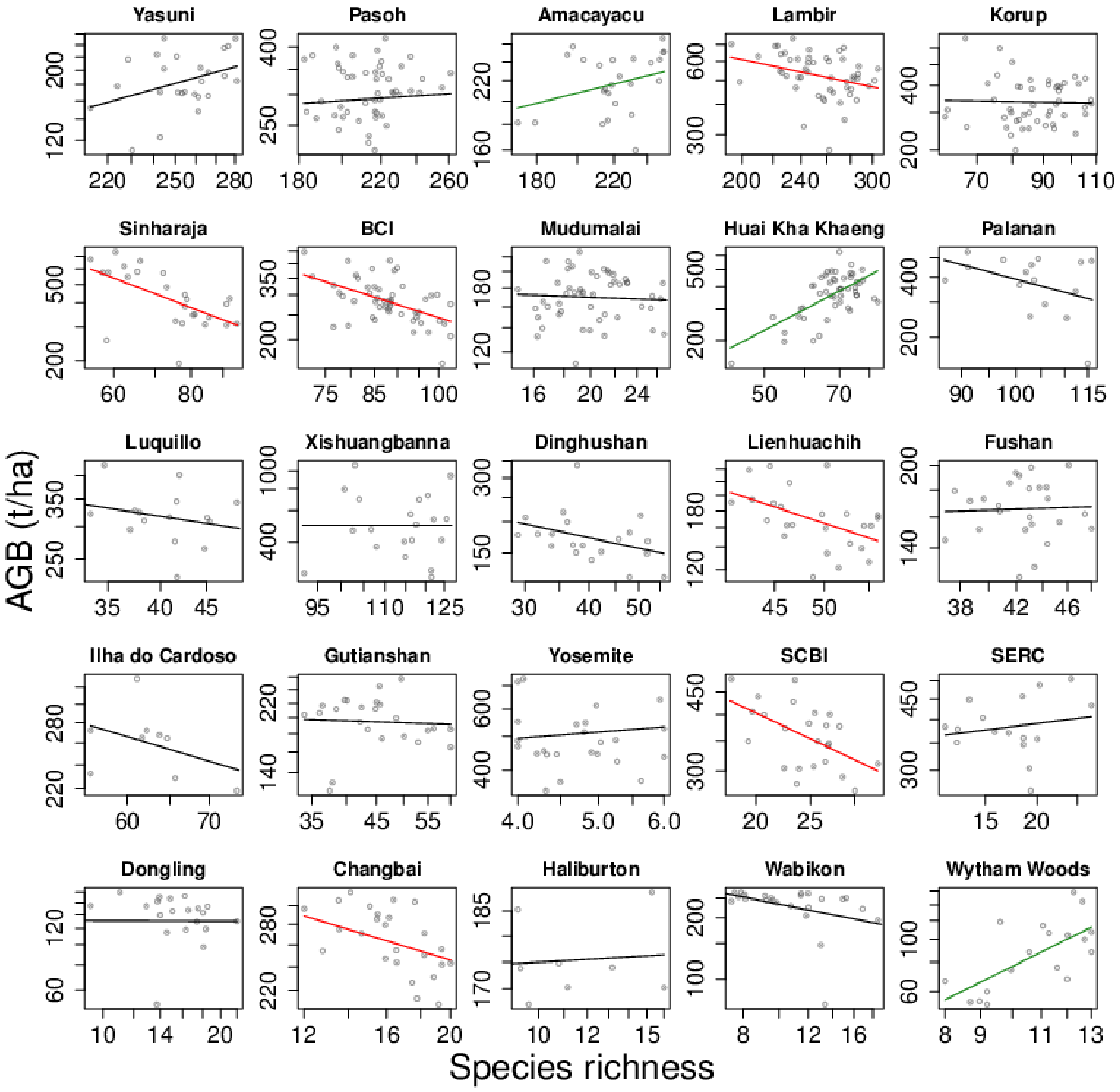

Fig. S6. Observed relationships between species richness and aboveground biomass (AGB) at the study sites at the 1.0 ha spatial scale.

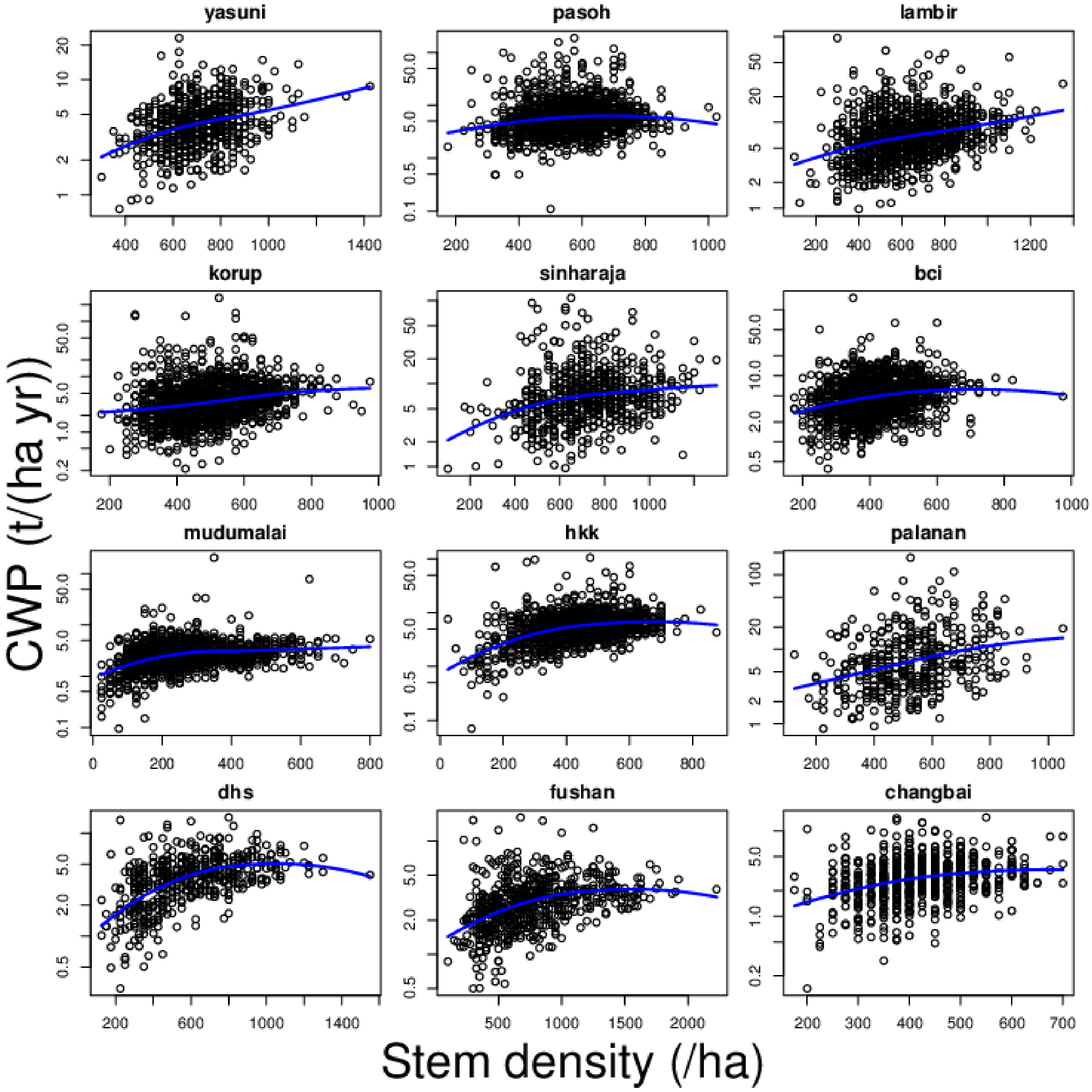

Fig. S7. LOESS regressions of coarse woody productivity (CWP) versus stem density at the 0.04 ha spatial scale.

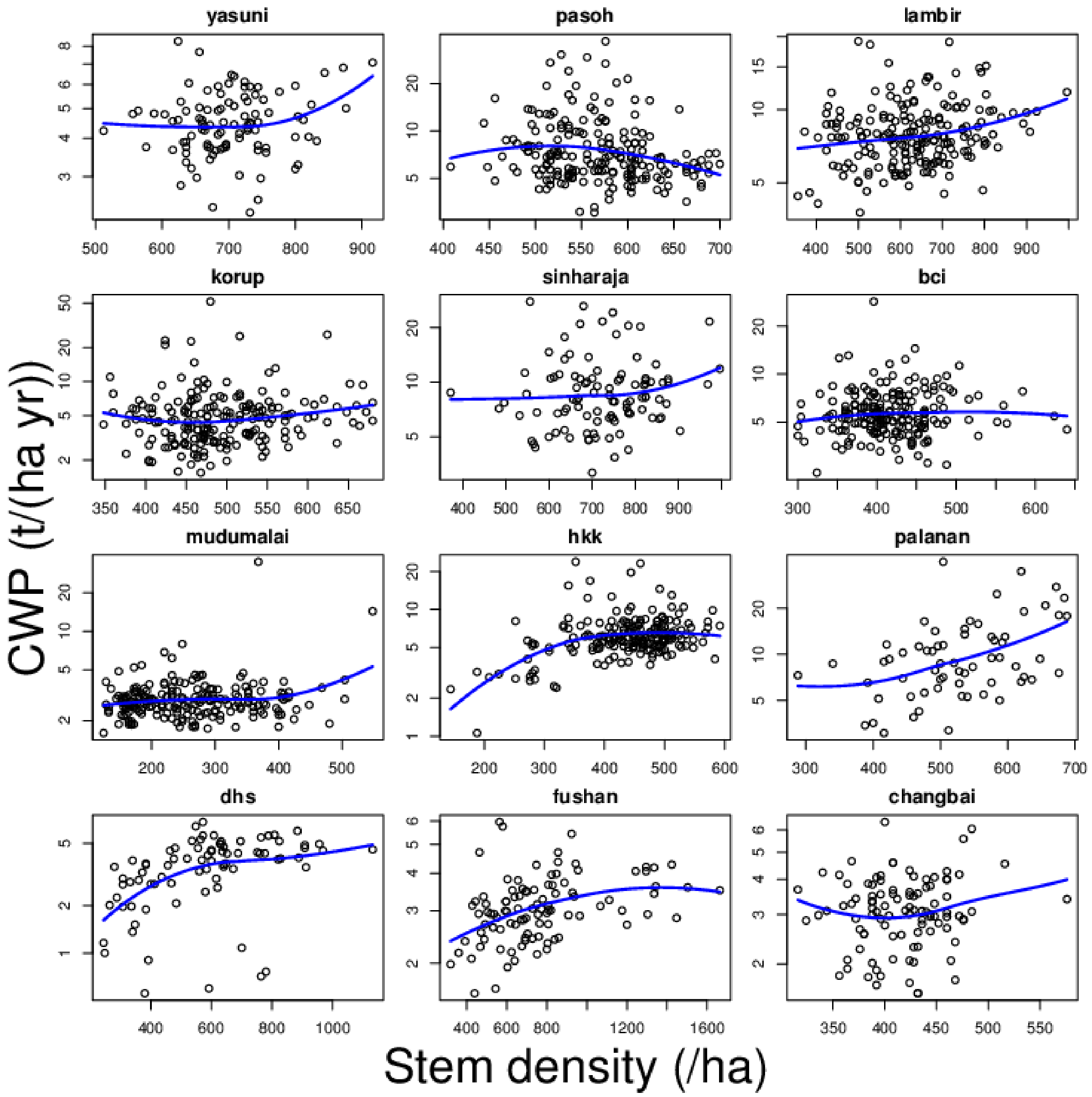

Fig. S8. LOESS regressions of coarse woody productivity (CWP) versus stem density at the 0.25 ha spatial scale.

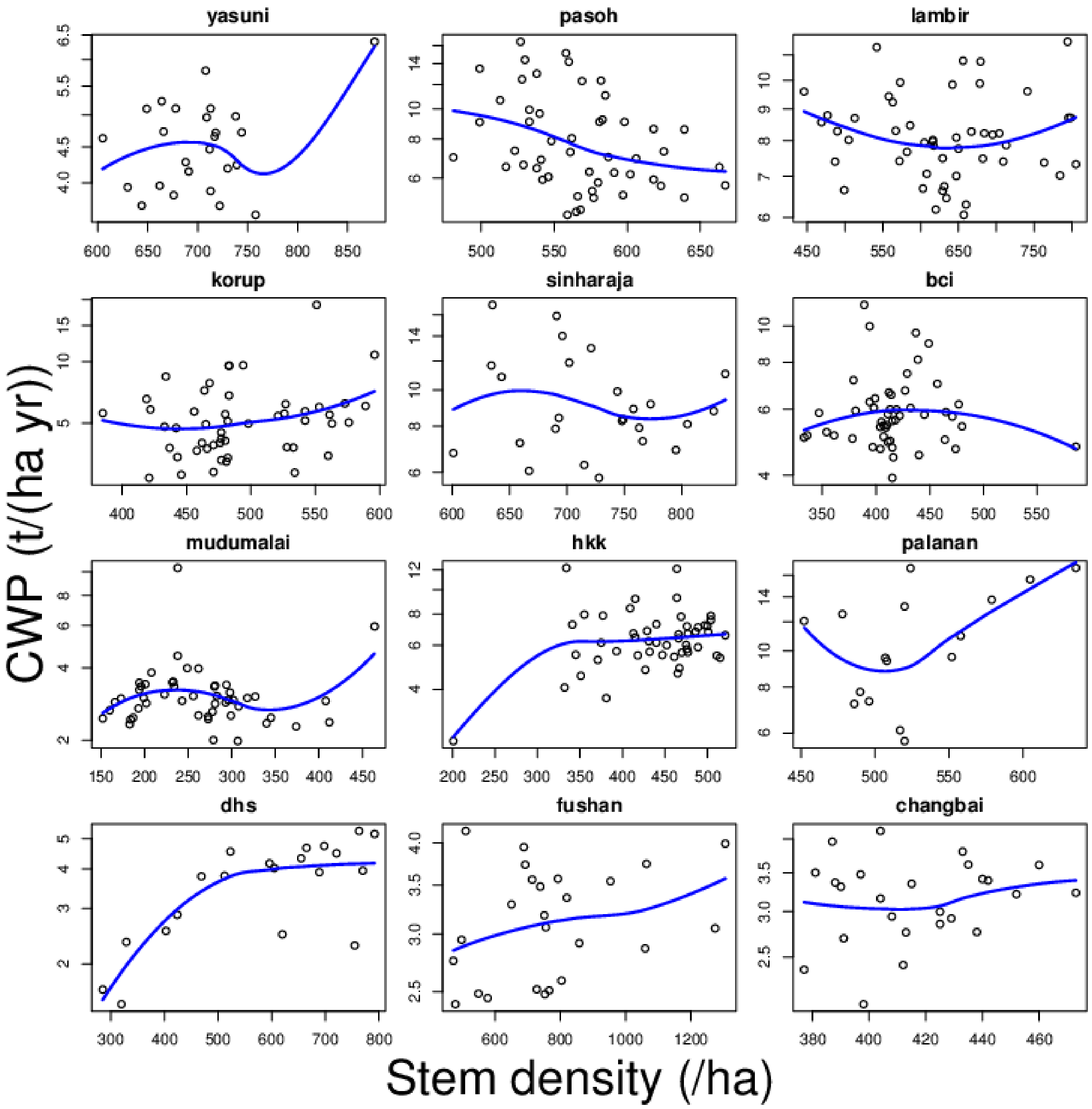

Fig. S9. LOESS regressions of coarse woody productivity (CWP) versus stem density at the 1.0 ha spatial scale.

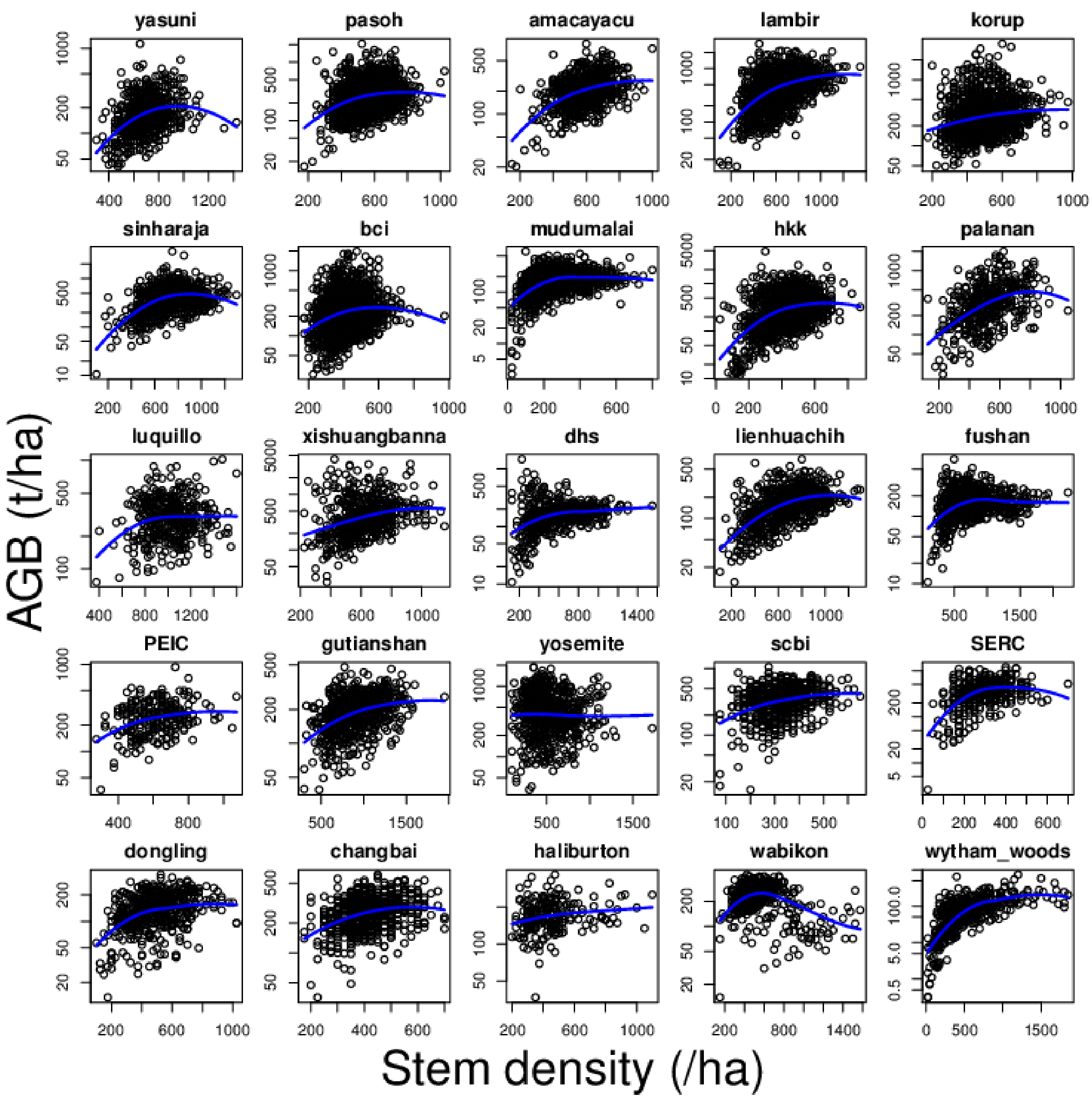

Fig. S10. LOESS regressions of aboveground biomass (AGB) versus stem density at the 0.04 ha spatial scale.

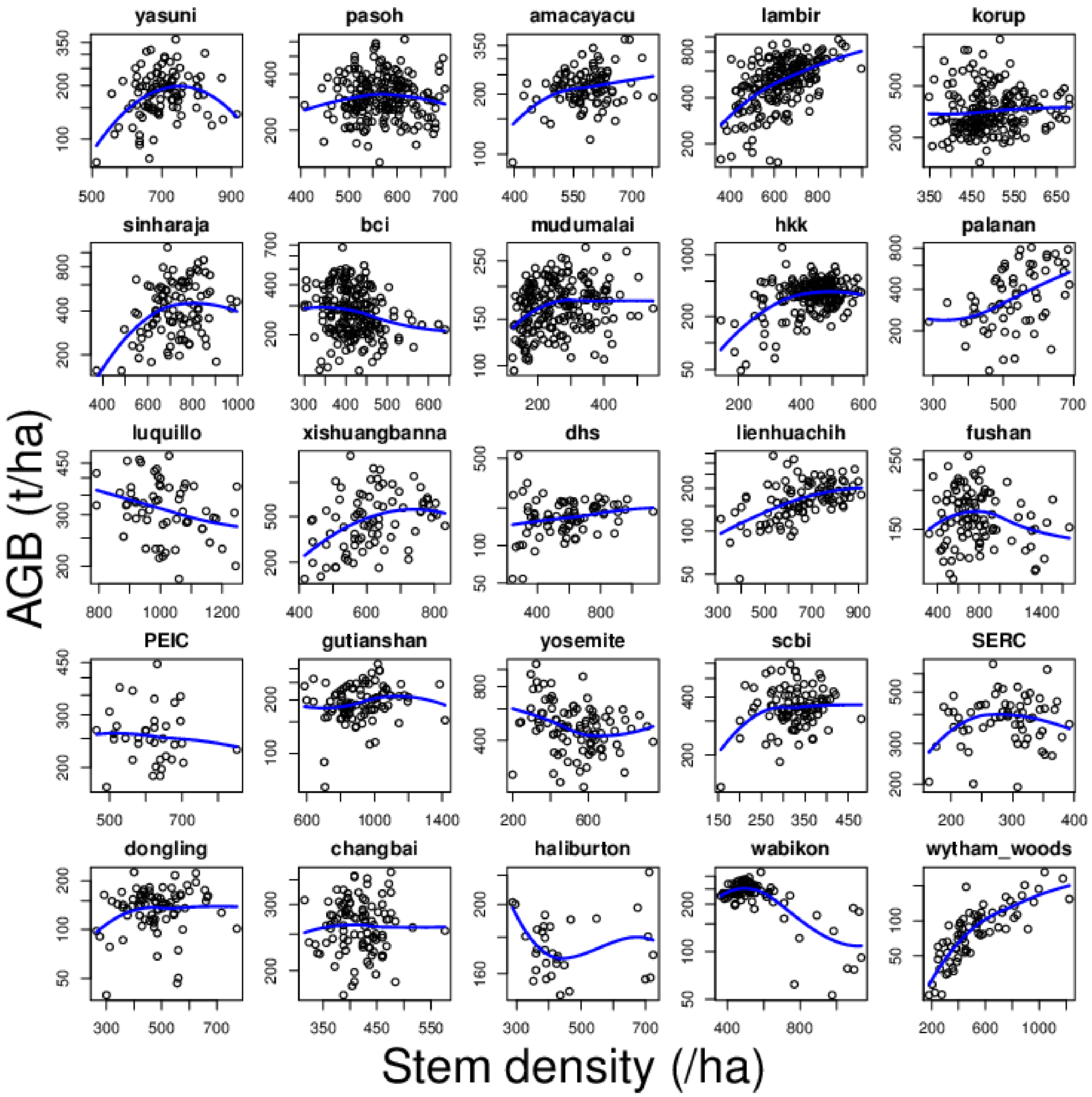

Fig. S11. LOESS regressions of aboveground biomass (AGB) versus stem density at the 0.25 ha spatial scale.

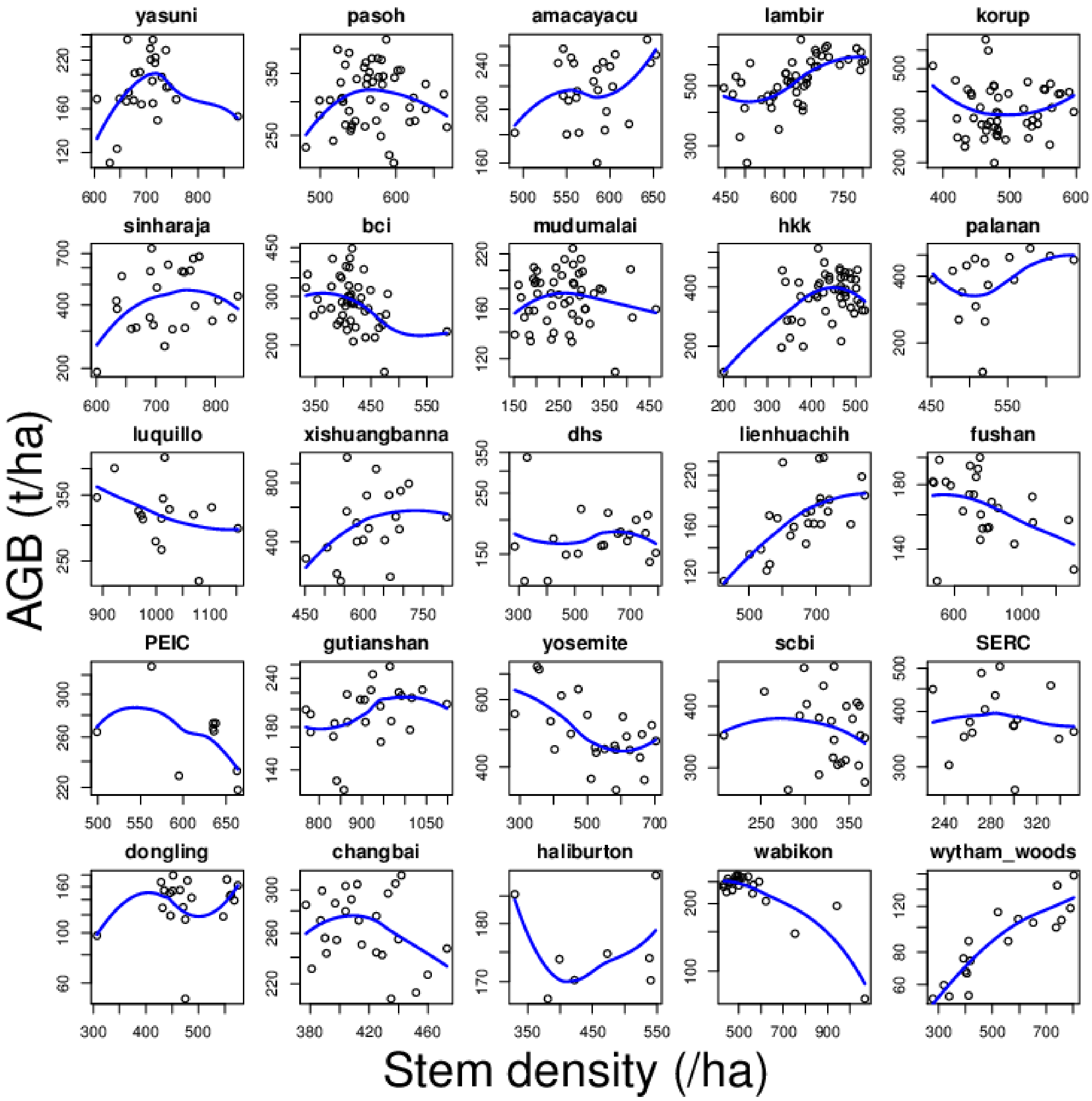

Fig. S12. LOESS regressions of aboveground biomass (AGB) versus stem density at the 1.0 ha spatial scale.

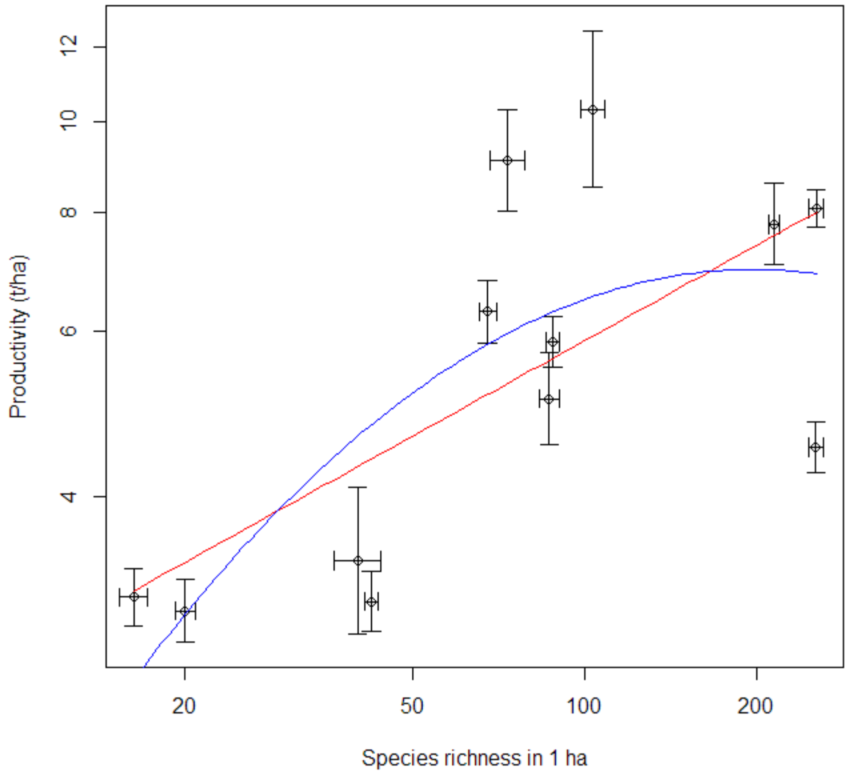

Fig. S13. Cross-site relationship of productivity to 1 ha species richness. Each point shows one site. Error bars show 95% confidence intervals on means based on 1 ha data. Red line shows linear regression ($y = a\,x + b$; $b = 0.22 \pm 0.50$, $p = 0.67$; $a = 0.34 \pm 0.11$, $p = 0.015$). Blue curve shows quadratic regression ($y = a\,x^2 + b\,x + c$; $c = -2.58 \pm 2.15$, $p = 0.26$; $b = 1.71 \pm 1.04$, $p = 0.13$; $c = -0.16 \pm 0.12$, $p = 0.22$).

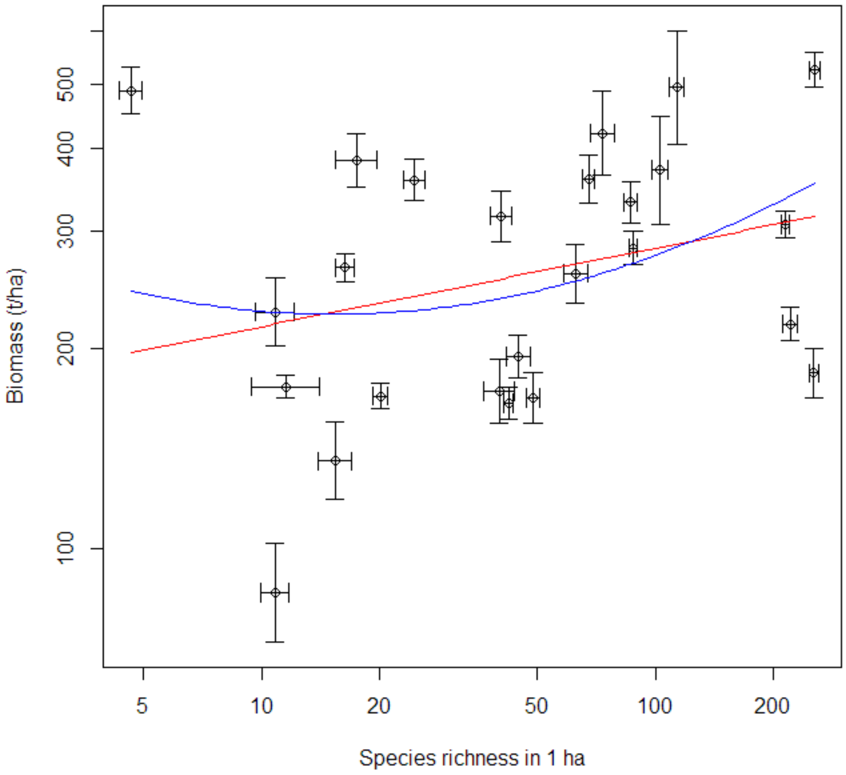

Fig. S14. Cross-site relationship of biomass to 1 ha species richness. Each point shows one site. Error bars show 95% confidence intervals on means based on 1 ha data. Red line shows linear regression ($y = a\,x + b$; $b = 5.10 \pm 0.33$, $p = 8.9\text{e-}14$; $a = 0.12 \pm 0.08$, $p = 0.17$). Blue curve shows quadratic regression ($y = a\,x^2 + b\,x + c$; $c = -5.84 \pm 0.97$, $p = 4.9\text{e-}6$; $b = -0.31 \pm 0.54$, $p = 0.57$; $c = 0.06 \pm 0.07$, $p = 0.43$).

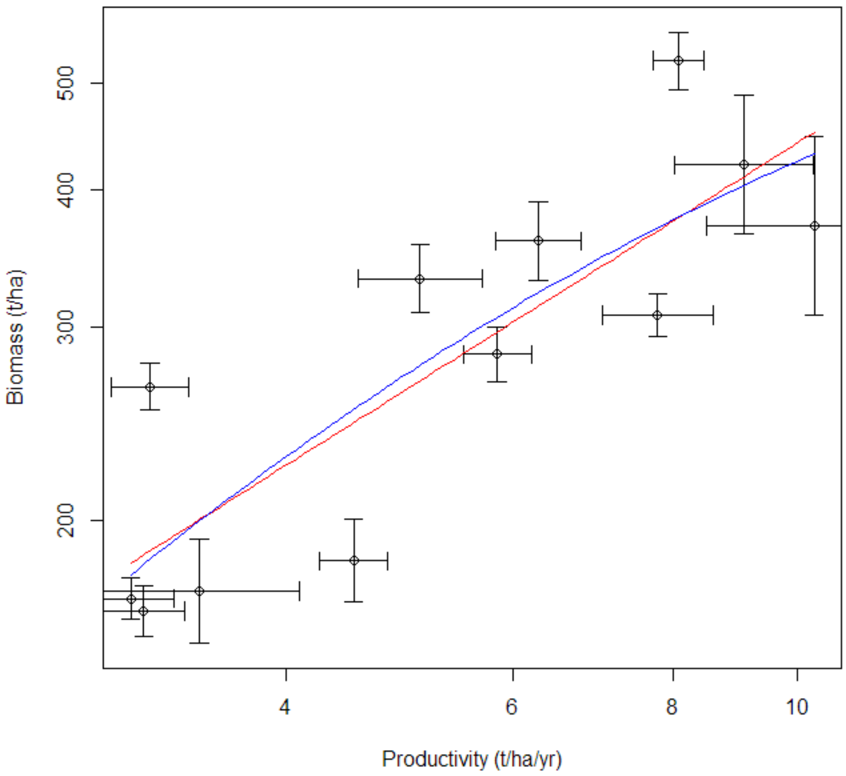

Fig. S15. Cross-site relationship of biomass to productivity. Each point shows one site. Error bars show 95% confidence intervals on means based on 1 ha data. Red line shows linear regression ($y = a\,x + b$; $b = 4.39 \pm 0.26$, $p = 9.8\text{e-}9$; $a = 0.74 \pm 0.15$, $p = 0.00059$). Blue curve shows quadratic regression ($y = a\,x^2 + b\,x + c$; $c = -3.92 \pm 1.29$, $p = 0.014$; $b = 1.34 \pm 1.63$, $p = 0.43$; $c = -0.18 \pm 0.48$, $p = 0.72$).

Table S1. Methods used to estimate productivity and biomass at each site. WSG = wood specific gravity (g/cm^3). Generic allometric equations for dry, moist and wet tropical forests (Chave *et al.* 2005) were based on tree diameter only (not tree height), and were combined with species-specific WSG values unless otherwise noted. Species-specific WSG values were based on site data if available, or otherwise means of species values in global databases (e.g., Chave *et al.* 2006), or otherwise means of genus values, or otherwise means of family values, or else unweighted means of values for species at the site. Sites are ordered by latitude, as in Table 1.

Site name	Allometric equations
Yasuni	Wet tropical forest (Chave *et al.* 2005)
Pasoh	Moist tropical forest (Chave *et al.* 2005)
Amacayacu	Moist tropical forest (Chave *et al.* 2005)
Lambir	Equations constructed from dipterocarp forest data in Chave *et al.* (2005) and Niiyama *et al.* (2010)
Korup	Moist tropical forest (Chave *et al.* 2005)
Sinharaja	Moist tropical forest (Chave *et al.* 2005)
Barro Colorado Island	Moist tropical forest (Chave *et al.* 2005)
Mudumalai	Dry forest (Chave *et al.* 2005)
Huai Kha Khaeng	Dry forest (Chave *et al.* 2005)
Palanan	Moist forest (Chave *et al.* 2005)
Luquillo	Moist tropical forest (Chave *et al.* 2005) with WSG = 0.5
Xishuangbanna	Equations constructed from dipterocarp forest in Chave *et al.* (2005) and Niiyama *et al.* (2010)
Dinghushan	Site-specific equation (Wen *et al.* 1997)

Lienhuachih	See Fushan
Fushan	Moist tropical forest (Chave *et al.* 2005) with height parameter estimated from a height-DBH relationship; WSG measured in the field for common species and taken from global database for rare species (http://datadryad.org/handle/10255/dryad.235)
Ilha do Cardoso	Moist tropical forest (Chave *et al.* 2005)
Gutianshan	Site-specific equations (Lin *et al.* in review)
Yosemite	Site-specific equations (Lutz *et al.* 2012)
SCBI	Moist tropical forest (Chave *et al.* 2005) with WSG = 0.5
SERC	Moist tropical forest (Chave *et al.* 2005)
Dongling	Moist tropical forest (Chave *et al.* 2005) with WSG = 0.5
Changbai	Species-specific equations; generic Chinese tree/shrub equations for missing species (Wang 2006; Li *et al.* 2010)
Haliburton	Site-specific equations (Jenkins *et al.* 2003)
Wabikon	Moist tropical forest (Chave *et al.* 2005) with WSG = 0.5
Wytham Woods	Species-specific equation for the three canopy dominant species (Bunce 1968); averaged equation for other species

Table S2. (Excel file) Numerical output from the fits of the generalized least squares models of productivity and biomass on species richness.

Table S3. (Excel file) Numerical output from the fits of the generalized least squares models of productivity and biomass on species richness in the analysis controlling for stem density.

Table S4. Summary data for species richness, aboveground biomass (AGB), and coarse wood productivity (CWP) of 1 ha quadrats at each site. Numbers show mean ± standard deviation computed on a log scale.

Site name	Species richness in 1 ha	AGB in 1 ha (t)	CWP in 1 ha (t/yr)
Yasuni	253.3 [235.8,272]	184.0 [150.1,225.6]	4.52 [3.91,5.22]
Pasoh	214.1 [197.6,232]	307.8 [262.5,360.9]	7.78 [5.51,10.99]
Amacayacu	220.2 [199.2,243.4]	217.9 [189.9,250]	
Lambir	253.7 [228.2,281.9]	524.1 [424.8,646.6]	8.08 [6.92,9.45]
Korup	86.7 [75.7,99.3]	332.2 [259.5,425.2]	5.08 [3.45,7.5]
Sinharaja	73.3 [62.1,86.4]	421.3 [298.6,594.6]	9.09 [6.77,12.2]
Barro Colorado Island	88.0 [80.5,96.1]	283.6 [231.9,346.8]	5.84 [4.72,7.23]
Mudumalai	20.1 [17.4,23.2]	169.9 [145.9,197.9]	3.03 [2.32,3.95]
Huai Kha Khaeng	67.7 [60,76.4]	359.4 [270,478.4]	6.29 [4.81,8.22]
Palanan	103.2 [94.7,112.3]	371.2 [264.3,521.4]	10.3 [7.27,14.6]
Luquillo	40.5 [36.4,45.1]	316.8 [271.8,369.2]	
Xishuangbanna	113.6 [104.1,124.1]	494.1 [328,744.2]	
Dinghushan	40.1 [33.1,48.7]	172.6 [137.6,216.6]	3.42 [2.36,4.97]
Lienhuachih	48.9 [44.6,53.7]	168.9 [137.6,207.4]	
Fushan	42.4 [39.8,45.1]	165.7 [146,188]	3.10 [2.61,3.69]
Ilha do Cardoso	62.7 [57.6,68.3]	259.5 [229.4,293.4]	
Gutianshan	44.8 [38,52.7]	194.6 [164.1,230.7]	
Yosemite	4.7 [4,5.4]	488.5 [403.8,590.9]	
SCBI	24.4 [21,28.4]	358.7 [304.5,422.5]	
SERC	17.4 [13.9,21.8]	384.2 [324.7,454.5]	
Dongling	15.4 [12.6,18.8]	135.7 [102.8,179.1]	
Changbai	16.3 [14.3,18.6]	264.7 [235.7,297.3]	3.13 [2.66,3.69]
Haliburton	11.5 [9.2,14.3]	175.4 [168.1,183]	
Wabikon	10.8 [8.3,14.1]	227.2 [173.6,297.3]	

Wytham Woods	10.8 [9.3,12.7]	86.1 [61.5,120.5]

References

Bunce R.G.H. (1968). Biomass and production of trees in a mixed deciduous woodland: I. Girth and height as parameters for the estimation of tree dry weight. *Journal of Ecology*, 56, 759-775.

Chave J., Andalo C., Brown S., Cairns M.A., Chambers J.Q., Eamus D., Folster H., Fromard F., Higuchi N., Kira T., Lescure J.P., Nelson B.W., Ogawa H., Puig H., Riera B. & Yamakura T. (2005). Tree allometry and improved estimation of carbon stocks and balance in tropical forests. *Oecologia*, 145, 87-99.

Chave J., Muller-Landau H.C., Baker T.R., Easdale T.A., Ter Steege H. & Webb C.O. (2006). Regional and phylogenetic variation of wood density across 2456 neotropical tree species. *Ecological Applications*, 16, 2356-2367.

Jenkins J.C., Chojnacky D.C., Heath L.S. & Birdsey R.A. (2003). National-scale biomass estimators for United States tree species. *Forest Sciences*, 49, 12-35.

Li X., Guo Q., Wang X. & Zheng H. (2010). Allometry of understory tree species in a natural secondary forest in northeast China. *Scientia Silvae Sinicae*, 46, 22-32.

Lin D., Lai J., Muller-Landau H.C., Mi X. & Ma K. (in review). Topographic variation in aboveground biomass in a subtropical evergreen broad-leaved forest in China. *PLoS ONE*.

Lutz J.A., Larson A.J., Swanson M.E. & Freund J.A. (2012). Ecological importance of large-diameter trees in a temperate mixed-conifer forest. *PLoS ONE*, 7, e36131.

Niiyama K., Kajimoto T., Matsuura Y., Yamashita T., Matsuo N., Yashiro Y., Ripin A., Kassim A.R. & Noor N.S. (2010). Estimation of root biomass based on excavation of individual root systems in a primary dipterocarp forest in Pasoh Forest Reserve, Peninsular Malaysia. *Journal of Tropical Ecology*, 26, 271-284.

Wang C.K. (2006). Biomass allometric equations for 10 co-occurring tree species in Chinese temperate forests. *Forest Ecology and Management*, 222, 9-16.

Wen D., Wei P., Kong G., Zhang Q. & Huang Z. (1997). Biomass study of the community of Castanopsis chinesis + Cryptocarya concinna + Schima superba in a southern China reserve. *Acta Ecologica Sinica*, 17, 497-504.