The sixteen species’ elevational distribution were modelled with a unique intercept for each species and quadratic relationship with the environmental gradient. The peak of the probability distribution varied among species (Fig. 2a), with different species occurring at different elevations. Species formed a continuum of elevation associations (Fig. 2a), from *Shorea beccariana*, with a probability of occurrence peaking at an elevation of 114.6 m asl (95% Credible Interval Crl = 111.3 – 120.3, Table S2), to *S. seminis,* which peaked at 48.5 m (95% Crl = 55.8 – 65.4, Table S2).

For 42 tree species we found that the adult tree wood density is non-random (Fig 2b). Overall mean species’ wood density values in ¼ ha areas increase with elevation gradients (GLS, β = 107.69, 95% CI = 92.20 – 130.49, Fig 2b). This confirms the traditional view that higher elevations have typically have higher wood density. However, the reality is more complex. We found a quantile regression reveals a triangular relationship between wood density and elevation: at low elevations both high and low wood density species occur (βQ=0.025 = 4.57, 95% CI = -1.697 – 16.17, Fig. 2c); at higher elevation higher wood densities are more dominant (βQ=0.975 = 159.81, 95% CI = 88.60 – 247.48, Fig. 2c). We therefore suggest that adult wood density variables may have a role in predicting species distributions.

Species varied in their tolerances to water inundation. A model comparison between having the species interaction with water inundation and one without showed the model containing the interaction to explain significantly more variation (χ2 = 34.96, df = 15, *P* = 0.002). At one extreme, seedlings of *Shorea seminis* showed no difference in the probability of mortality between inundated and non-inundated areas (Fig. 2c). *Shorea beccariana*, representing the other end of the response gradient,had an absolute risk increase in mortality of 40.9% when inundated (Fig. 2c). Seedling mortality was not affected by soil pH, soil texture, light, or flash floods (178 mm of rainfall in 6 hours; *see Methods*), nor did inclusion of any of these predictors remove the relationship between seedling mortality and inundation. We refer to the difference in seedling mortality (*Δp(mortality)*) with respect to water inundation as “inundation sensitivity”.

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| **Figure 2 | Adult elevational distribution at landscape scales of 4 species (a), wood density distribution along elevation gradients (b), quantile regression slop coefficients with bootstrap, and interaction between species and water inundation on the probability of seedling mortality at micro-topographical scales (b). (a)** The elevation distribution of adult dipterocarps within a 160ha forest plot using the Integrated Nested Laplace Approximation. The 95% credible intervals (n=5000) were extracted from the posterior distribution. Grey shading of the panel for below (light blue) and above (dark blue) average wood densities. **(b)** Species differ in seedling sensitivity to water inundation along micro-topographical gradients within the alluvial zone. Points are ordered by the most likely elevation the adults are found, and grouped by below and above average wood densities for these species. 95% confidence intervals are bootstrapped (n = 5000). **(c)** quantile regression (0.025, 0.1, 0.5, 0.9, 0.975) typical wood density vs. typical elevation (m asl) of ¼ ha plots (n = 675). |

Investigating the inundation sensitivity of the 9 species that were only affected by inundation we find that there is a tight correlation between sensitivity to flooding and elevational distributions (r2 = 0.66, βinundation sensitivity = 0.00391, 95% CI = 0.00213 – 0.00806, Fig SX). To understand this further we decided to take into account wood density, as this is non-randomly dispersed around the plot…

Inundation sensitivity explained 37.7% of interspecific variation in species elevation distribution (βinundation sensitivity = 146.31, 95% CI = 63.8 – 209.5, Fig. 3a), indicating that tolerant individuals occur where areas with inundation episodes. Our model also predicts a positive relationship between wood density and elevation (βwood density =107.0, 95% CI = 1.06 – 214.8, Fig. 3b). As water inundation is controlled for, this suggests that species with high wood density as adults coexist on the alluvial plain partly because of water inundation episodes. We tested these predicted values were a tight fit to median elevational associations outside the large plot, and found that for every 1 m increase in the predicted elevation the actual elevation was raised 0.86 m (95% CI = 0.27 – 1.45). The median elevation of a species was predicted with an r2 of 0.51 from the model and accounted for 59.2% of variation in the 297 individuals.

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| **Figure 3 | Estimated adult elevation distribution predicted by inundation sensitivity (a) and wood density (b) against the estimated adult elevation distribution (m).** Lines and 95% Confidence intervals were predicted from the model. Sixteen species were included in the analysis. Red dashed lines indicate the univariate analysis. Percentage variance for each variable from an ANOVA test. |

High wood density may provide an advantage within wetter areas. We tested this relationship with a log-log model and found adult wood density predicts seedling inundation sensitivity. Increasing wood density by 1% causes inundation sensitivity to declines by 2.4% (βlog(wood density) =2.37, 95% CI = -3.06 – -1.78, n = 16). However, using wood density values collected as saplings wood density does not confer to tolerance to inundation (βwood density =-0.805, 95% CI = -2.715 – 1.192, n = 16), nor does seedling wood density provide tolerance (βwood density = -0.7417, 95% CI = -1.6409 – 0.4471, n = 9). At these three ontogenic stages, we found a convergence on adult values. Seedling-adult values were the least similar with an (r2 = 0.21, Fig. 4a), seedlings were more similar to saplings (r2 = 0.50, Fig. 4a), and sapling were closest to adults (r2 = 0.64, Fig. 4a). We conducted a nursery experiment on 10 species of dipterocarps (9 overlapping species). Here too, we found that seedling wood density values were not correlated to inundation effects (βwood density = -1.07, 95% CI = -2.18 – 0.048). As wood density clearly does not provide tolerance to inundation, we questioned whether water inundation itself could cause changes in wood density.

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| **Figure 4 | ontogenic convergence on adult values, changes in wood density through inundation and biomass.** **(a)** r-squared values for wood density on the three life history stages. **(b)** the change in wood density predicted by inundation frequency. **(c)** quadratic relationship between inundation frequency and the fit between inundated seedlings and adults. **(d)** allometic scaling showing the carbon intake per unit biomass, predicting the change in wood density. Points are partial residuals where. Bootstrapped confidence intervals **(b, d)**, whereas **(c)** is predicted form the model. |

Increasing the frequency of water inundation typically increased wood density values by 0.1 g cm-3, equating to an average increase 22.2 % (βlog(treatment + 1) = 0.032, 95% CI = 0.027– 0.036, Fig. 4b). Furthermore, the values non-linearly converged on the adults before declining in similarity at extreme ends of flooding (Fig. 4c). Previous research has indicated that high wood density maybe a response to stress relating to lowering the carbon intake per unit biomass. Therefore, we created an allometric model for carbon intake per total biomass of each seedling and the carbon intake per plant and found that as carbon declines wood density increases (βcarbon intake per unit biomass = -5.656, 95% CI = -7.297 – -4.797, Fig. 4d). Thus, some species may grow into adult values within wet zones as a response to inundation, as a result of period of low carbon intake as a response to inundation episodes.