**Appendix C. Random forest models for meta-analysis**

We conducted an exploratory search for relevant moderators using R package MetaForest (Van Lissa, 2017). Random forest regression trees use bootstrapped data samples to construct multiple regression trees from which the importance of the moderator variables is defined. We used this approach to identify which moderators were most influential in explaining heterogeneity for each response and resilience index. Random forests have substantial flexibility to model non-linear effects and interactions between moderators, and are also quite robust to overfitting thanks to the diligent application of bootstrap aggregation. This approach was a solution to detect relevant moderators in our meta-analysis, which included a relatively small sample size. Its main advantages over classic meta-regression are that it is robust to overfitting, captures non-linear effects and interactions, and is robust even when there are many moderators relative to cases.

To eliminate irrelevant moderators, we used 100-fold replicated feature selection, and retained only moderators with positive variable importance in > 50% of replications. The main analysis of both total and leaf litterfall mass flux consisted of 7,500 regression trees with random-effect weights, four candidate variables per split, and a minimum of three cases per terminal node. We conducted a first round of random forests including all the moderating variables and checked for high correlations among them, progressively eliminating variables that did not show relative contribution in explaining the effect sizes.

The final random forest analysis for the response of total litterfall mass flux included 14 moderator variables (Figure 4a). Based on the root mean squared error, the best combination of tuning parameters were random-effects weights, with 4 candidate variables per split, and a minimum of 2 cases per terminal node. The random forests output ranked the 13 most important moderators out of the initial 17 included in the random forest analysis. The R2cv = 0.5 and R2oob = 0.45 suggested that the model detected reliable patterns in the data.

The final random forest analysis for the response of leaf litterfall mass flux included 14 moderator variables (Figure 4b). Based on the root mean squared error, the best combination of tuning parameters for this analysis were random-effects weights, with 2 candidate variables per split, and a minimum of 2 cases per terminal node. The random forests output ranked the 13 most important moderators out of the initial 17 included in the random forest analysis. The R2cv = 0.74 and R2oob = 0.20 suggested that the model detected reliable patterns in the data

Add Info Resilience Total Litterfall and Leaf Litterfall Mass flux