New Phytologist

***New Phytologist* Supporting Information**

Article title: Hurricanes increase tropical forest vulnerability to drought
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Article acceptance date: 07 April 2022

The following Supporting Information is available for this article:

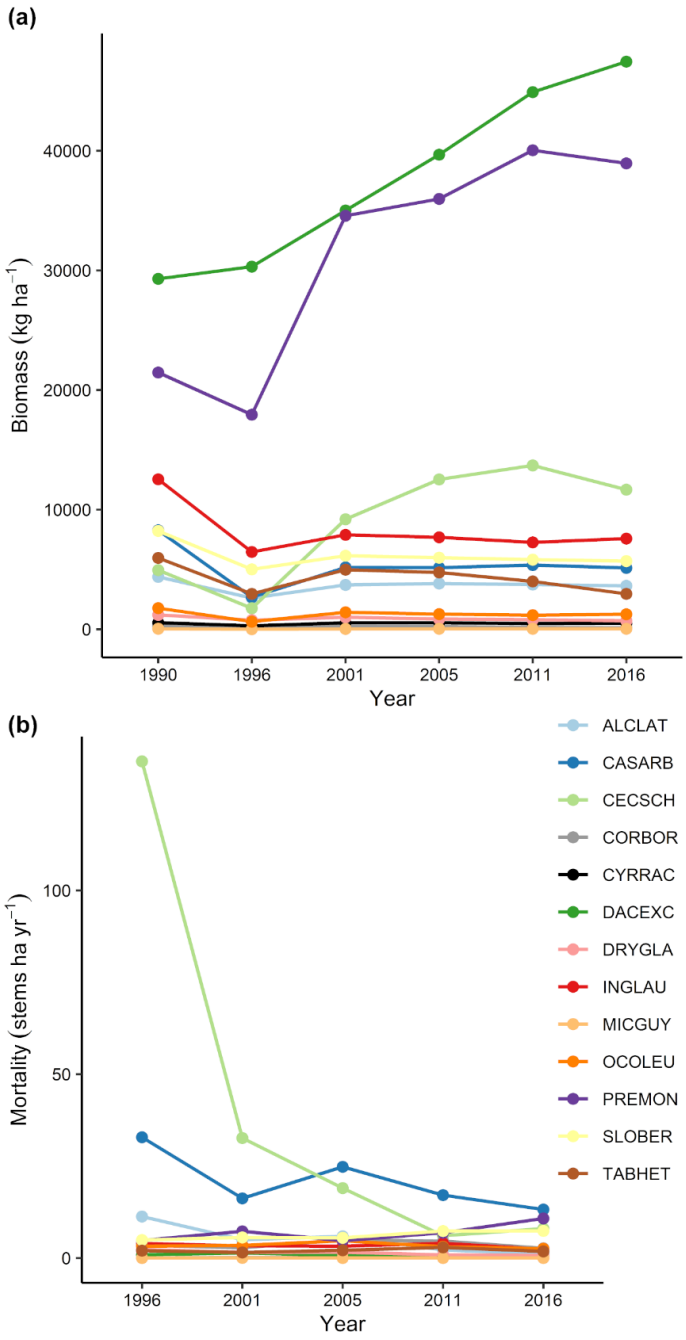


**Fig. S1** Biomass (a) and stem mortality (b) from after Hurricane Hugo of the target species in the 16-ha Luquillo Forest Dynamics Plot and over 26 years of post-hurricane succession. Hurricane Hugo occurred in 1989; biomass was derived from data collected immediately after the passage of the hurricane, including all stems ≥10cm DBH (see methods). Plot censuses are conducted approximately every five years. Colors indicate species codes: *Alchornea latifolia* (ALCLAT), *Casearia arborea* (CASARB), *Cecropia schreberiana* (CECSCH), *Cordia borinquensis* (CORBOR), *Cyrilla racemiflora* (CYRRAC), *Dacryodes excelsa* (DACEXC), *Drypetes glauca* (DRYGLA), *Inga laurina* (INGLAU), *Micropholis guyanensis* (MICGUY), *Ocotea leucoxylon* (OCOLEU), *Prestoea acuminata* var. *montana* (PREMON), *Sloanea berteroana* (SLOBER), and *Tabebuia heterophylla* (TABHET).

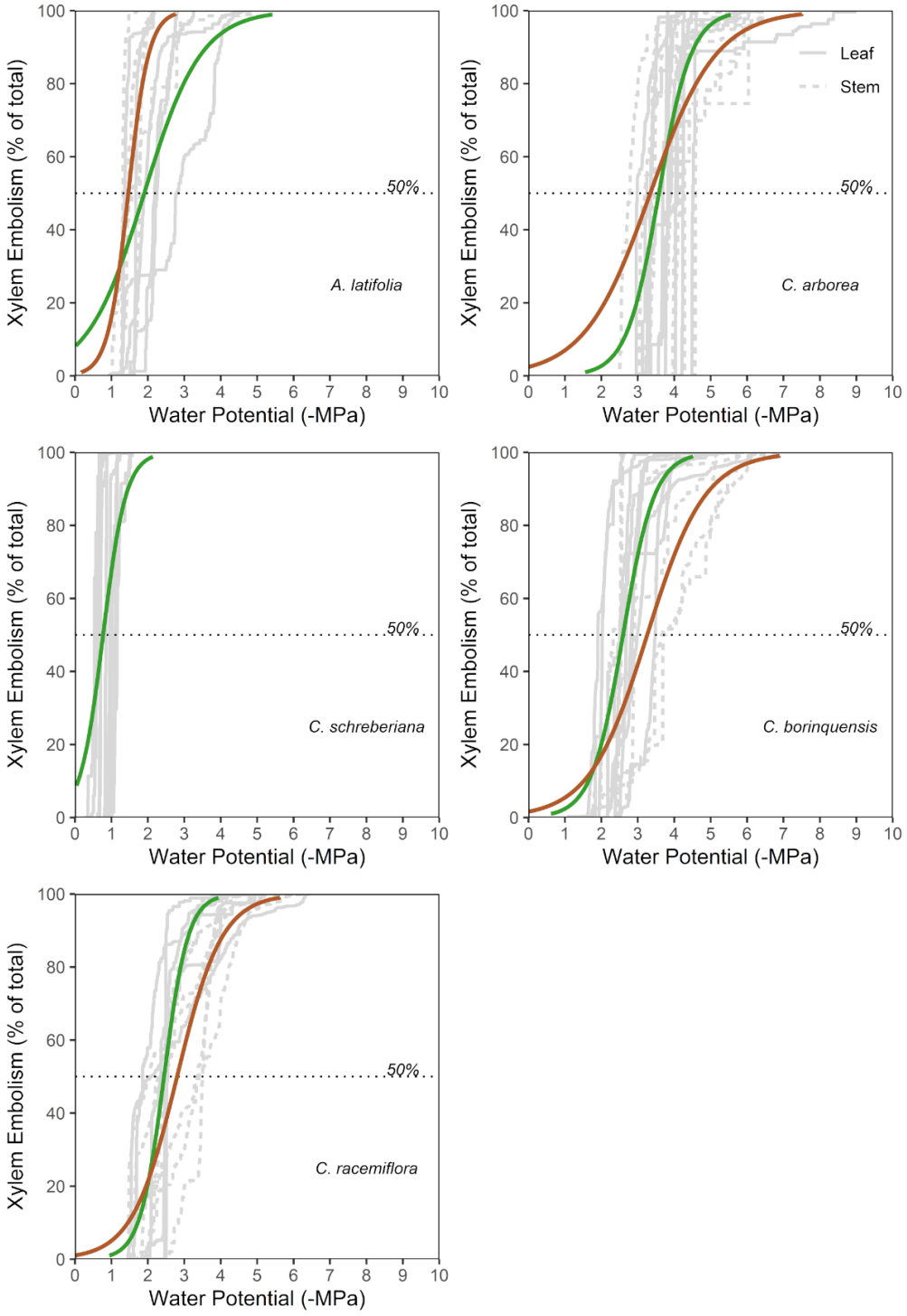


**Fig. S2** Leaf (solid gray lines) and stem (dashed grey lines) optical vulnerability curves. Horizontal dotted line indicates xylem embolism at 50% of total xylem embolism. Solid colored lines are logistic regressions fitted to the leaf (green) and stem (brown) data.

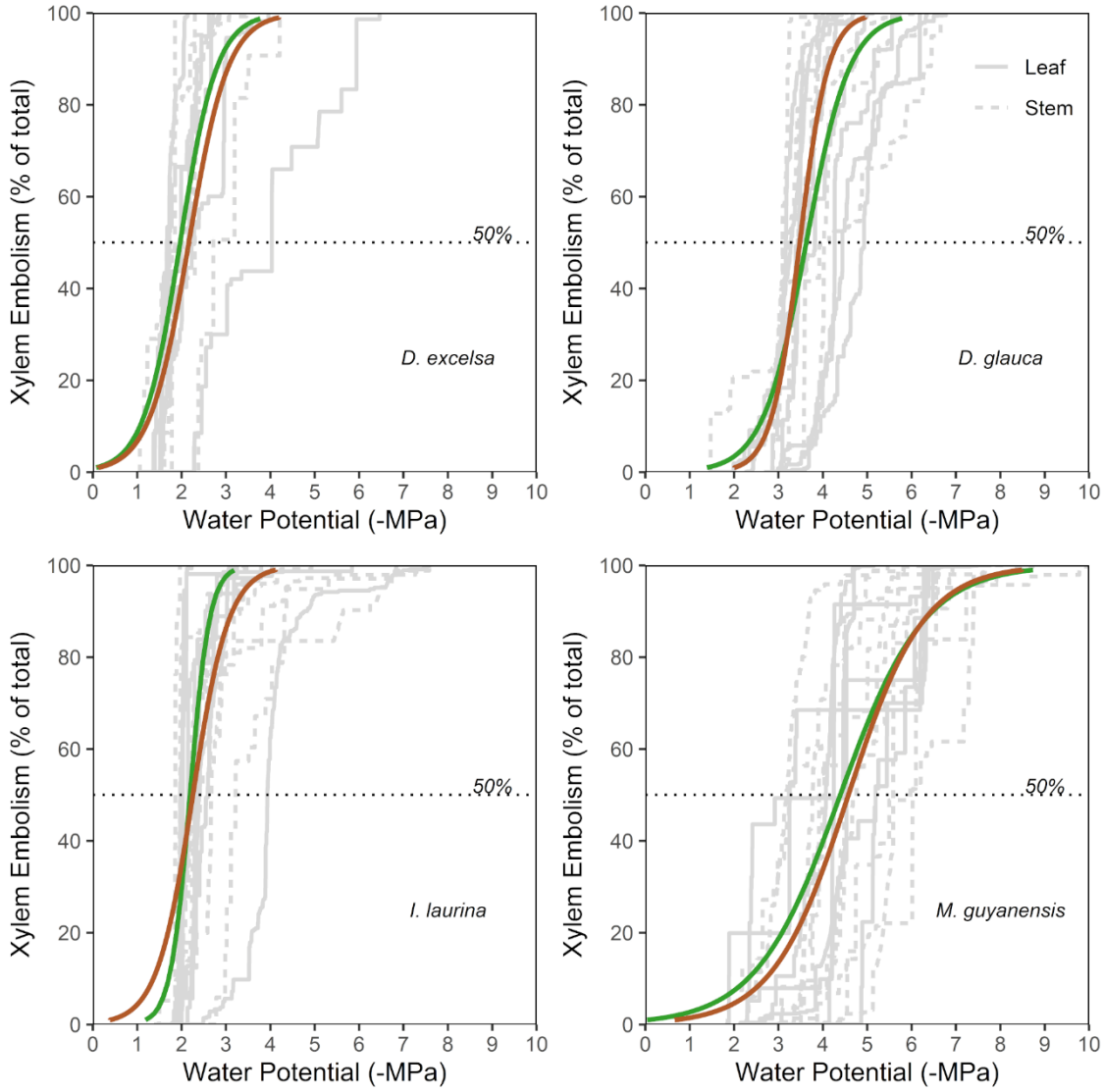


**Fig. S3** Leaf (solid gray lines) and stem (dashed grey lines) optical vulnerability curves. Horizontal dotted line indicates xylem embolism at 50% of total xylem embolism. Solid colored lines are logistic regressions fitted to the leaf (green) and stem (brown) data.

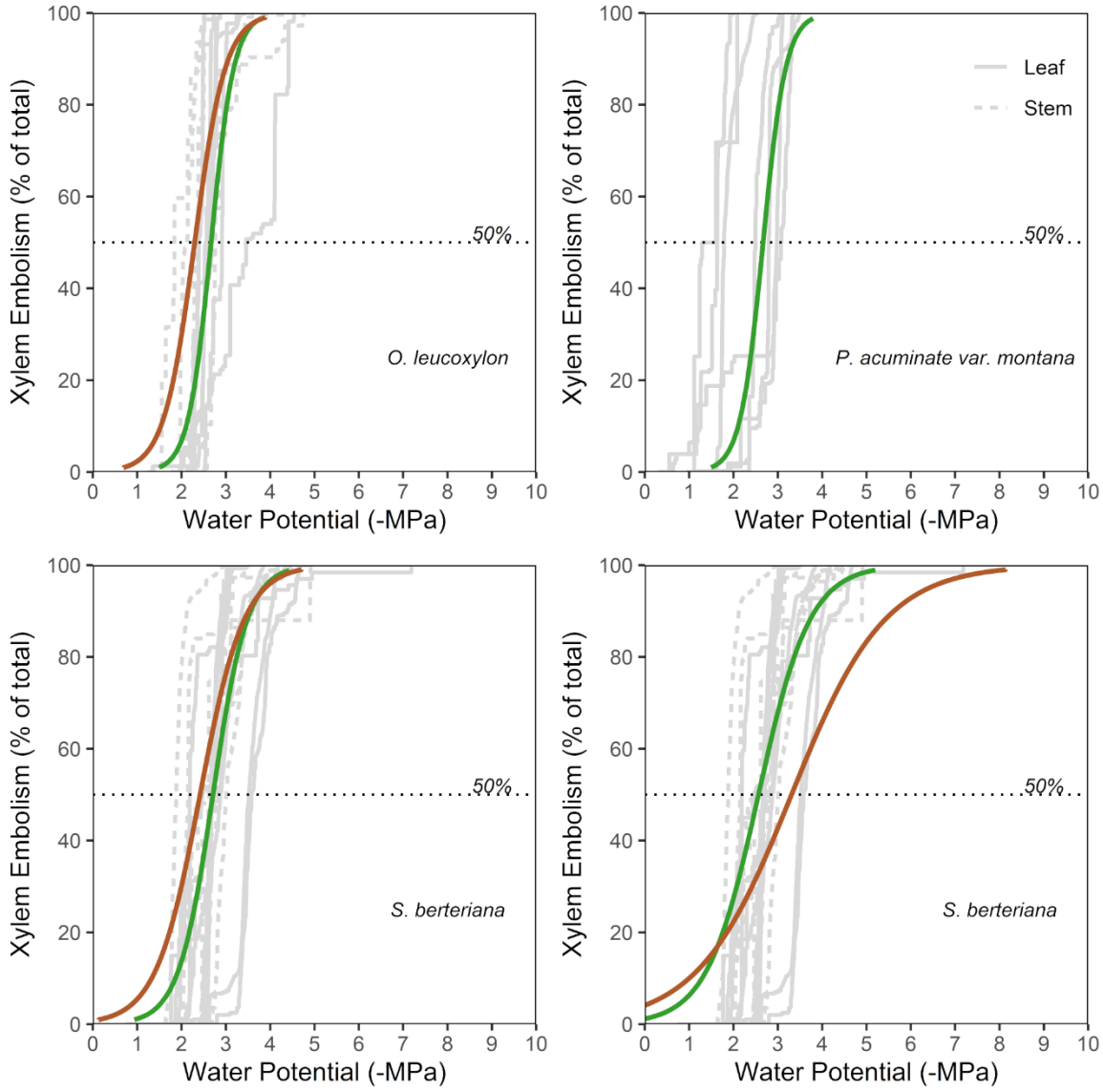


**Fig. S4** Leaf (solid gray lines) and stem (dashed grey lines) optical vulnerability curves. Horizontal dotted line indicates xylem embolism at 50% of total xylem embolism. Solid colored lines are logistic regressions fitted to the leaf (green) and stem (brown) data.

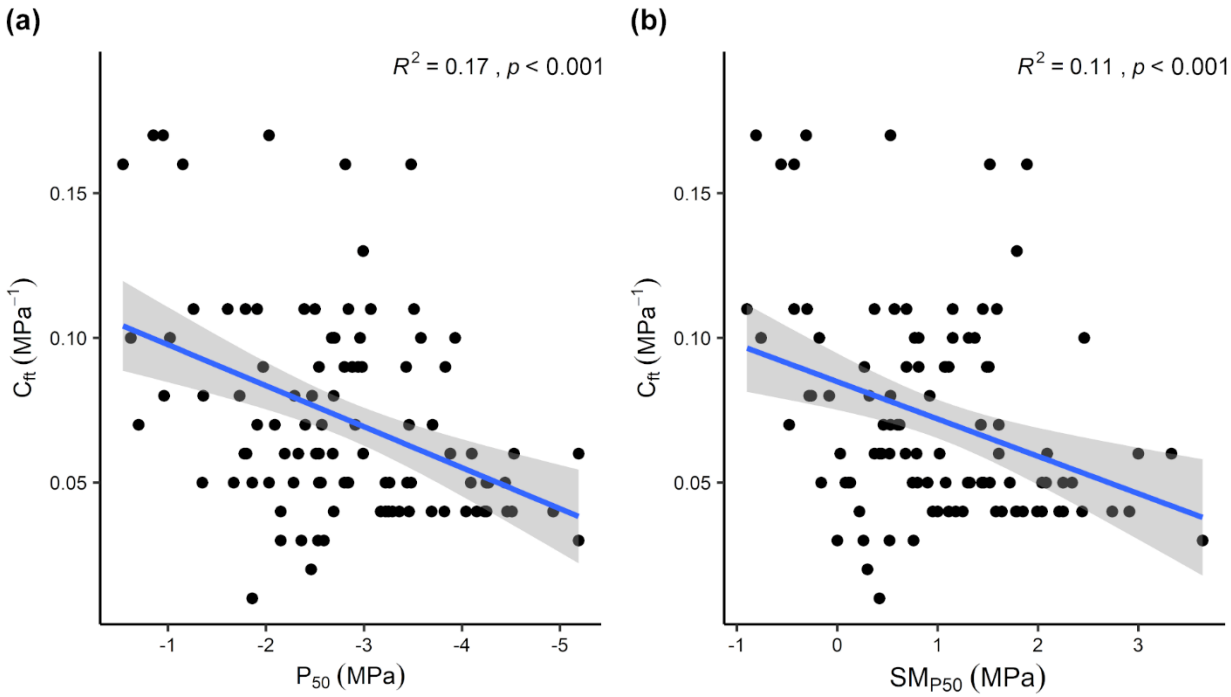


**Fig. S5** Tradeoff between capacitance at full turgor ($C_{ft}$) **(a)** and $P_{50}$ **(b)** and safety margins ($SM_{P50}$) for all measured individuals. Blue lines depict linear regressions and shaded areas represent 95% confidence intervals.

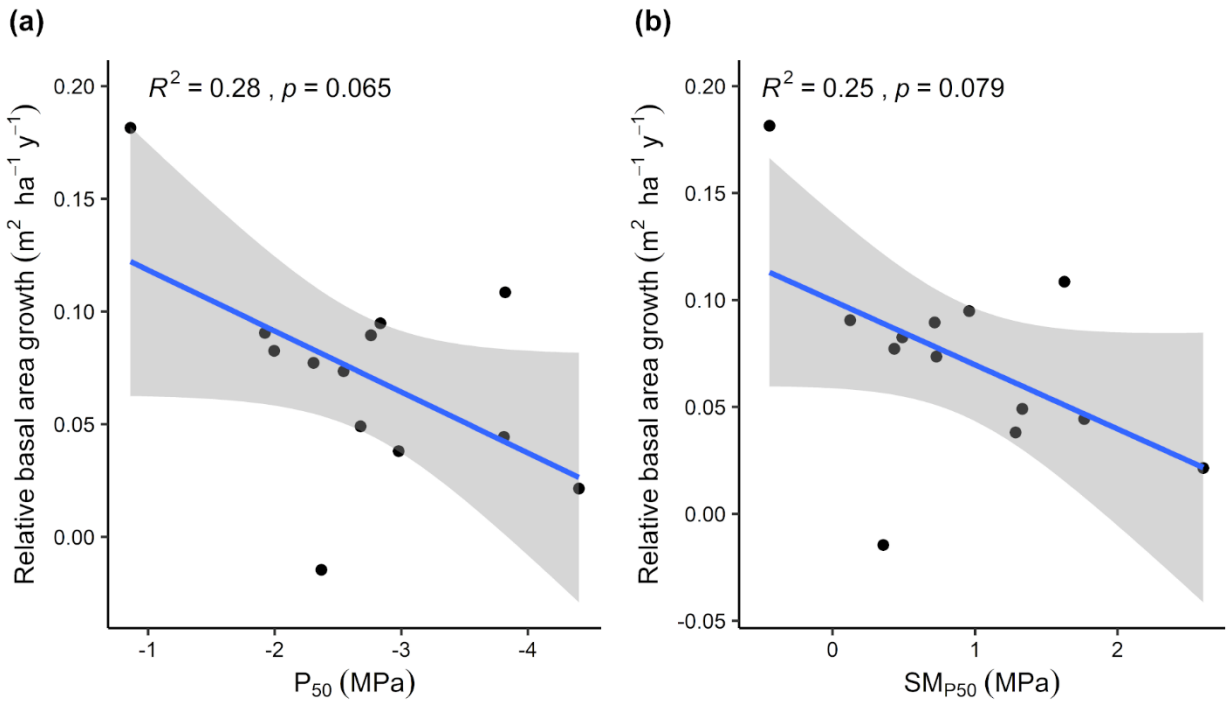


**Fig. S6** Associations between $P_{50}$ (**a**) and safety margins ($SM_{P50}$; **b**) and relative basal area growth during the first five years after Hurricane Hugo. Blue lines depict linear regressions and shaded areas represent 95% confidence intervals.

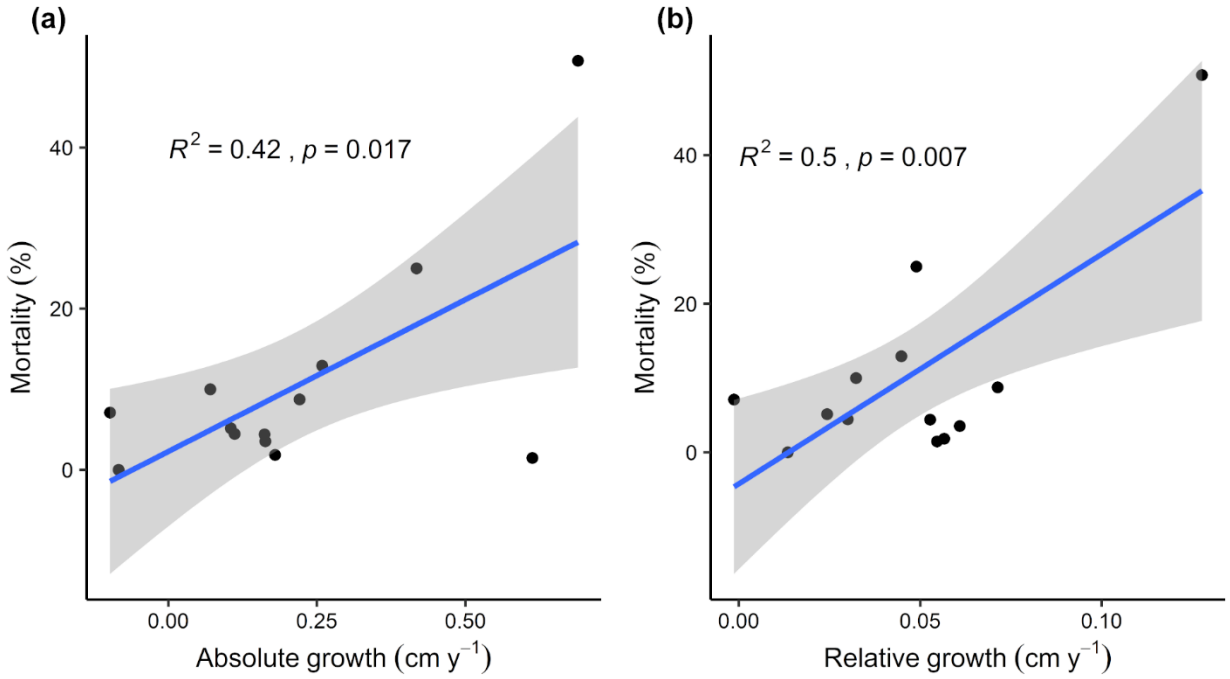


**Fig. S7** Associations between the proportion of stems with DBH ≥ 10cm for each of the 13 tree species that were immediately killed by Hurricane Hugo and absolute annual diameter growth (**a**) and relative annual growth (**b**) during the first five years after H. Hugo. Blue lines depict linear regressions and shaded areas represent 95% confidence intervals.

**Table S1** Number of measured individuals per species for each of the hydraulic traits. The range in sample size reflects the need to remeasure some stems when using the optical vulnerability technique.

| **Species** | **Code** | **$\Psi_{tlp}$ (MPa)** | **$C_{ft}$ ($MPa^{-1}$)** | **$P_{50}$ (MPa)** |
|---|---|---|---|---|
| *Alchornea latifolia* | ALCLAT | 7 | 7 | 6 |
| *Casearia arborea* | CASARB | 12 | 12 | 11 |
| *Cecropia schreberiana* | CECSCH | 10 | 8 | 10 |
| *Cordia borinquensis* | CORBOR | 7 | 7 | 7 |
| *Cyrilla racemiflora* | CYRRAC | 7 | 7 | 6 |
| *Dacryodes excelsa* | DACEXC | 10 | 10 | 5 |
| *Drypetes glauca* | DRYGLA | 10 | 10 | 9 |
| *Inga laurina* | INGLAU | 9 | 9 | 9 |
| *Micropholis guyanensis* | MICGUY | 13 | 13 | 8 |
| *Ocotea leucoxylon* | OCOLEU | 7 | 7 | 6 |
| *Prestoea acuminata* var. *montana* | PREMON | 10 | 10 | 8 |
| *Sloanea berteroana* | SLOBER | 10 | 10 | 9 |
| *Tabebuia heterophylla* | TABHET | 11 | 11 | 10 |

**Table S2** Mean and standard deviation of all the hydraulic traits and maximum tree height per species. See Table S1 for species names.

| Code | $\Psi_{tlp}$ (MPa) | SD $\Psi_{tlp}$ (MPa) | $C_{ft}$ ($MPa^{-1}$) | SD $C_{ft}$ ($MPa^{-1}$) | $P_{50}$ (MPa) | SD $P_{50}$ (MPa) | $SM_{P50}$ (MPa) | SD $SM_{P50}$ (MPa) | Max height (m) | SLA ($cm^2\ g^{-1}$) | WD ($g\ cm^{-3}$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALCLAT | -1.47 | 0.19 | 0.06 | 0.01 | -2.00 | 0.63 | 0.49 | 0.56 | 50 | 191.83 | 0.40 |
| CASARB | -2.19 | 0.12 | 0.05 | 0.02 | -3.82 | 0.46 | 1.63 | 0.44 | 30 | 218.19 | 0.58 |
| CECSCH | -1.30 | 0.18 | 0.13 | 0.04 | -0.86 | 0.21 | -0.44 | 0.23 | 70 | 184.78 | 0.26 |
| CORBOR | -1.35 | 0.15 | 0.13 | 0.03 | -2.68 | 0.55 | 1.33 | 0.53 | 20 | 179.34 | 0.71 |
| CYRRAC | -1.94 | 0.37 | 0.03 | 0.02 | -2.31 | 0.27 | 0.43 | 0.29 | 30 | 79.63 | 0.58 |
| DACEXC | -1.68 | 0.30 | 0.06 | 0.02 | -1.92 | 0.27 | 0.12 | 0.40 | 100 | 137.59 | 0.53 |
| DRYGLA | -2.07 | 0.21 | 0.05 | 0.01 | -3.81 | 0.60 | 1.77 | 0.51 | 30 | 146.75 | 0.67 |
| INGLAU | -1.82 | 0.16 | 0.07 | 0.03 | -2.54 | 0.64 | 0.73 | 0.77 | 70 | 198.41 | 0.63 |
| MICGUY | -1.89 | 0.32 | 0.05 | 0.01 | -4.40 | 0.62 | 2.60 | 0.66 | 60 | 81.50 | 0.70 |
| OCOLEU | -2.03 | 0.15 | 0.07 | 0.00 | -2.76 | 0.38 | 0.72 | 0.36 | 50 | 128.38 | 0.46 |
| PREMON | -2.02 | 0.10 | 0.10 | 0.01 | -2.37 | 0.71 | 0.36 | 0.80 | 50 | 174.79 | 0.31 |
| SLOBER | -1.93 | 0.21 | 0.09 | 0.02 | -2.84 | 0.45 | 0.96 | 0.38 | 100 | 119.71 | 0.77 |
| TABHET | -1.69 | 0.25 | 0.07 | 0.02 | -2.98 | 0.69 | 1.28 | 0.71 | 60 | 167.67 | 0.66 |

**Table S3** F, p-values, and degrees of freedom (df) from ANOVAs of hydraulic traits by species.

| Trait | F, p-value | df |
|---|---|---|
| $\Psi_{tlp}$ | 14.06, <0.001 | 12, 110 |
| $C_{ft}$ | 19.00, <0.001 | 12, 108 |
| $P_{50}$ | 26.29, <0.001 | 12, 91 |
| $SM_{P50}$ | 17.78, <0.001 | 12, 91 |

**Table S4** Results of linear regressions ($R^2$) of capacitance at full turgor ($C_{ft}$) by $P_{50}$ and safety margins ($SM_{P50}$). p-values in parentheses. All differences are significant at $p<0.001$.

| | $C_{ft}$ |
|---|---|
| $P_{50}$ | 0.17 (<0.00) |
| $SM_{P50}$ | 0.11 (<0.00) |

**Table S5** Basal area (a) and relative basal area (b) of stems ≥ 10 cm DBH of the target species in the six censuses of the 16-ha Luquillo Forest Dynamics Plot. Relative basal area is calculated based on the sum of basal areas of target species. See Table S1 for species names.

**(a) Basal area ($m^2$ $ha^{-1}$)**

| Cens. | ALCLAT | CASARB | CECSCH | CORBOR | CYRRAC | DACEXC | DRYGLA | INGLAU | MICGUY | OCOLEU | PREMON | SLOBER | TABHET | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 0.7070 | 1.5200 | 0.5114 | 0.0086 | 0.0816 | 4.4365 | 0.2176 | 1.8709 | 0.0072 | 0.3166 | 4.9929 | 1.1872 | 0.9583 | 16.82 |
| 1996 | 0.4269 | 0.5391 | 0.3085 | 0.0062 | 0.0473 | 4.4262 | 0.1399 | 0.9421 | 0.0022 | 0.1198 | 3.9635 | 0.7885 | 0.4734 | 12.18 |
| 2001 | 0.5973 | 0.9198 | 1.8454 | 0.0044 | 0.0793 | 5.2247 | 0.1867 | 1.2025 | 0.0062 | 0.2499 | 6.3386 | 1.0326 | 0.8080 | 18.50 |
| 2005 | 0.6077 | 0.9447 | 2.4828 | 0.0040 | 0.0765 | 5.8029 | 0.1626 | 1.1656 | 0.0064 | 0.2195 | 8.3557 | 0.9344 | 0.7614 | 21.52 |
| 2011 | 0.5904 | 1.0202 | 2.6320 | 0.0030 | 0.0641 | 6.4563 | 0.1533 | 1.1402 | 0.0064 | 0.2024 | 9.0720 | 0.9338 | 0.6449 | 22.92 |
| 2016 | 0.5669 | 0.9828 | 2.1532 | 0.0025 | 0.0682 | 6.7672 | 0.1385 | 1.1884 | 0.0064 | 0.2124 | 8.8772 | 0.9124 | 0.4862 | 22.36 |

**(b) Relative basal area**

| Cens. | ALCLAT | CASARB | CECSCH | CORBOR | CYRRAC | DACEXC | DRYGLA | INGLAU | MICGUY | OCOLEU | PREMON | SLOBER | TABHET | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 0.0420 | 0.0904 | 0.0304 | 0.0005 | 0.0049 | 0.2638 | 0.0129 | 0.1113 | 0.0004 | 0.0188 | 0.2969 | 0.0706 | 0.0570 | 1 |
| 1996 | 0.0350 | 0.0442 | 0.0253 | 0.0005 | 0.0039 | 0.3633 | 0.0115 | 0.0773 | 0.0002 | 0.0098 | 0.3253 | 0.0647 | 0.0389 | 1 |
| 2001 | 0.0323 | 0.0497 | 0.0998 | 0.0002 | 0.0043 | 0.2825 | 0.0101 | 0.0650 | 0.0003 | 0.0135 | 0.3427 | 0.0558 | 0.0437 | 1 |
| 2005 | 0.0282 | 0.0439 | 0.1153 | 0.0002 | 0.0036 | 0.2696 | 0.0076 | 0.0542 | 0.0003 | 0.0102 | 0.3882 | 0.0434 | 0.0354 | 1 |
| 2011 | 0.0258 | 0.0445 | 0.1148 | 0.0001 | 0.0028 | 0.2817 | 0.0067 | 0.0497 | 0.0003 | 0.0088 | 0.3958 | 0.0407 | 0.0281 | 1 |
| 2016 | 0.0254 | 0.0439 | 0.0963 | 0.0001 | 0.0030 | 0.3026 | 0.0062 | 0.0531 | 0.0003 | 0.0095 | 0.3970 | 0.0408 | 0.0217 | 1 |

**Table S6** Percent of relative change (**Δ**) of community-weighted mean (CWM) trait values between each census and the preceding one. The first census occurred in 1990 (see Methods for details).

| **Trait** | **Δ CWM 1990-1996 (%)** | **Δ CWM 1996-2001 (%)** | **Δ CWM 2001-2005 (%)** | **Δ CMW 2005-2011 (%)** | **Δ CWM 2011-2016 (%)** |
|---|---|---|---|---|---|
| $\Psi_{tlp}$ | -1.12 | -1.20 | 0.01 | 0.07 | 0.43 |
| $C_{ft}$ | 0.43 | 8.57 | 3.43 | 0.11 | -1.74 |
| $P_{50}$ | -5.22 | -3.07 | -1.90 | -0.50 | 0.65 |
| $SM_{P50}$ | -21.18 | -9.16 | -10.47 | -3.87 | 1.20 |