Supplementary Figures and Tables

Table S1 List of the model parameters that were allowed to vary during Monte Carlo simulations. All parameters varied by ± 25% in relation to the optimal values obtained during manual calibration. The sensitivity of stream flow model performance to evapotranspiration (ET) was assessed by fixing evapotranspiration-related parameters in a second round of Monte Carlo simulations. In this second round, the mean of the best values obtained for the three forest types were used as fixed values.

Parameter	Units	Best	Min	Max	ET sensitivity analysis
a (flow velocity multiplier) at *upstream location*	m^{-2}	0.10	0.075	0.13	
a (flow velocity multiplier) at *midstream location*	m^{-2}	0.10	0.075	0.13	
a (flow velocity multiplier) at *downstream location*	m^{-2}	0.10	0.075	0.13	
b (flow velocity exponent) at *upstream location*	-	0.70	0.525	0.875	
b (flow velocity exponent) at *midstream location*	-	0.70	0.525	0.875	
b (flow velocity exponent) at *downstream location*	-	0.70	0.525	0.875	
Rain multiplier for *Upland Evergreen*	-	0.80	0.60	1.00	
Rain multiplier for *Upland Deciduous*	-	1.10	0.825	1.375	
Rain multiplier for *Riparian Evergreen*	-	0.80	0.60	1.00	
Rain multiplier for *Riparian Deciduous*	-	1.10	0.825	1.375	
Degree day evapotranspiration for *Upland Evergreen*	mm $°C^{-1}$ day^{-1}	0.35	0.263	0.437	Fixed to 0.375
Degree day evapotranspiration for *Upland Deciduous*	mm $°C^{-1}$ day^{-1}	0.40	0.3	0.5	Fixed to 0.375
Degree day evapotranspiration for *Riparian Evergreen*	mm $°C^{-1}$ day^{-1}	0.35	0.263	0.437	Fixed to 0.375
Degree day evapotranspiration for *Riparian Deciduous*	mm $°C^{-1}$ day^{-1}	0.40	0.3	0.5	Fixed to 0.375
Growing degree threshold for *Upland Evergreen*	°C	3	2.25	3.75	Fixed to 4
Growing degree threshold for *Upland Deciduous*	°C	5	3.75	6.25	Fixed to 4
Growing degree threshold for *Riparian Evergreen*	°C	3	2.25	3.75	Fixed to 4
Growing degree threshold for *Riparian Deciduous*	°C	5	3.75	6.25	Fixed to 4
Canopy interception for *Upland Evergreen*	mm day^{-1}	0.75	0.562	0.937	
Canopy interception for *Upland Deciduous*	mm day^{-1}	1	0.75	1.25	
Canopy interception for *Riparian Evergreen*	mm day^{-1}	0.75	0.562	0.937	
Canopy interception for *Riparian Deciduous*	mm day^{-1}	1	0.75	1.25	
Drought runoff fraction for *Upland Evergreen, Soil layer*	-	0.1	0.075	0.125	
Drought runoff fraction for *Upland Deciduous, Soil layer*	-	0.2	0.15	0.25	
Time constant for *Upland Evergreen, Quick layer*	days	1.3	0.975	1.625	
Time constant for *Upland Deciduous, Quick layer*	days	1.7	1.275	2.125	
Time constant for *Riparian Evergreen, Quick layer*	days	1.3	0.975	1.625	
Time constant for *Riparian Deciduous, Quick layer*	days	1.7	1.275	2.125	
Time constant for *Upland Evergreen, Soil layer*	days	2.5	1.875	3.125	
Time constant for *Upland Deciduous, Soil layer*	days	2.5	1.875	3.125	
Time constant for *Riparian Evergreen, Soil layer*	days	5	3.75	6.25	
Time constant for *Riparian Deciduous, Soil layer*	days	5	3.75	6.25	
Time constant for *Evergreen, Groundwater layer*	days	70	52.5	87.5	
Time constant for *Deciduous, Groundwater layer*	days	100	75	125	
Evapotranspiration adjustment for *Upland Evergreen, Soil layer*	-	0.75	0.562	0.937	Fixed to 0.625
Evapotranspiration adjustment for *Upland Deciduous, Soil layer*	-	0.5	0.375	0.625	Fixed to 0.625
Evapotranspiration adjustment for *Riparian Evergreen, Soil layer*	-	0.75	0.562	0.937	Fixed to 0.625
Evapotranspiration adjustment for *Riparian Deciduous, Soil layer*	-	0.5	0.375	0.625	Fixed to 0.625

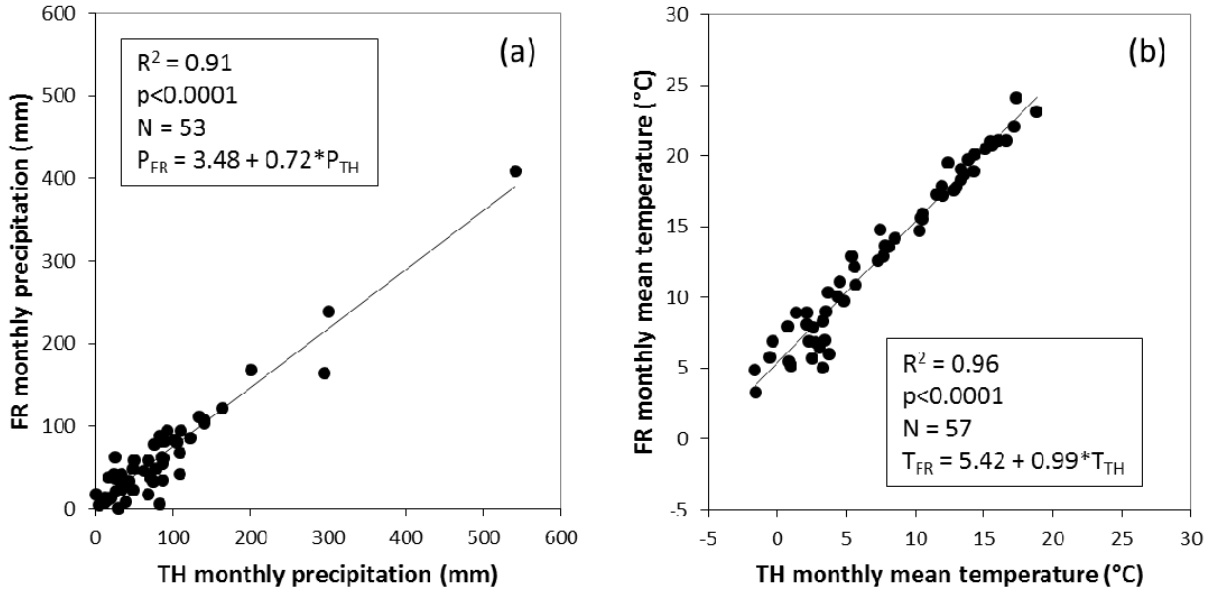

Figure S1 Linear regression between Font del Regàs (FR) and Turó de l'Home (TH) monthly precipitation (a) and monthly mean temperature (b) for the period 2010-2014. The obtained linear models were used to estimate daily precipitation (P) and temperature (T) at FR for the reference period (1981-2000). We assumed that the occurrence of days with P = 0 was equal between TH and FR. When P > 0 at TH, P at FR was estimated by dividing the intercept of the model equation by the number of days with P > 0 in that month, and adding the product of the model slope and the precipitation at TH (i.e. P at FR = 3.48/number of rainy days in the month + $0.72 \times P_{TH}$). Daily P and T at FR for the future period (2081–2100) were constructed from the estimated values at the reference period using the IPCC scenarios as described in the main manuscript.

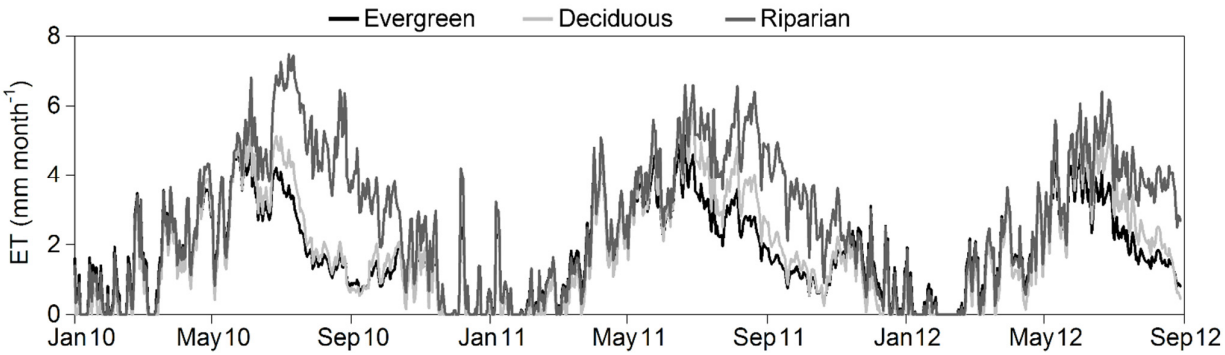

Figure S2 Daily values of simulated evapotranspiration (ET) in the evergreen (black), deciduous (grey), and riparian (dark grey) forests during the period January 2010–August 2012.