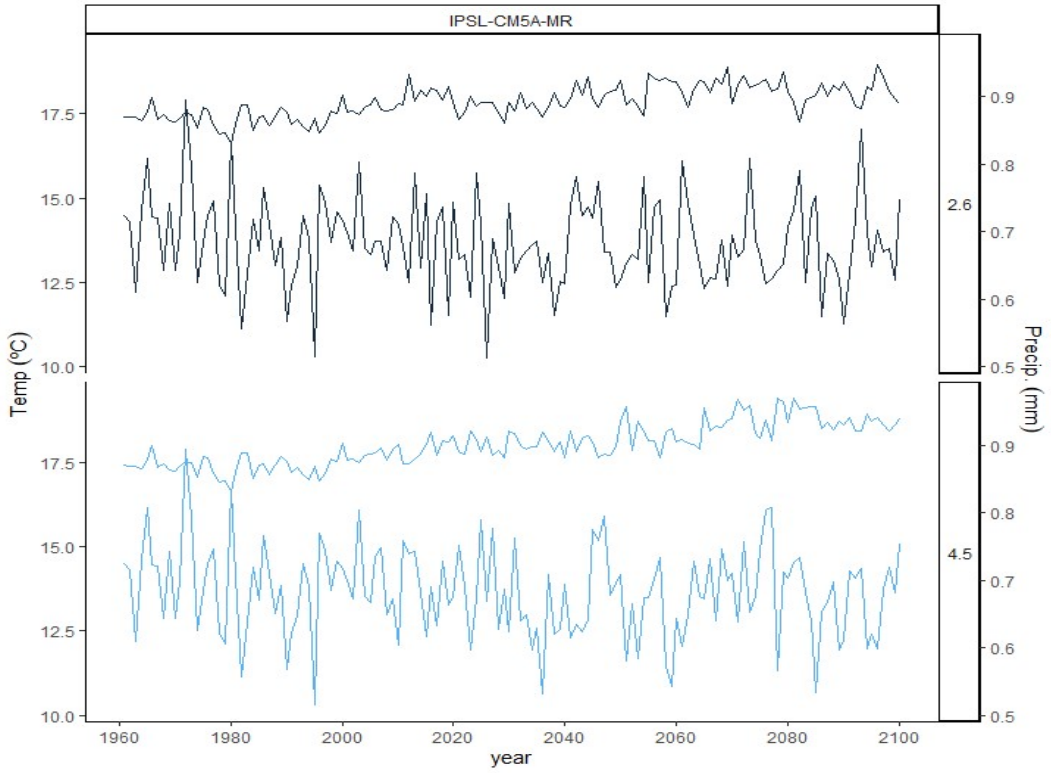

Figure S1. Global climate models (CMIP5) projections derived from model IPSL.CM5-MR across two RCP scenarios (2.6 and 4.5) of *Pinus canariensis* stands at Tenerife (Canarian Islands, Spain). Abbreviations: Prcp (precipitation, mm)-descendant trend, Temp (mean temperature, ºC)-ascendant trend.

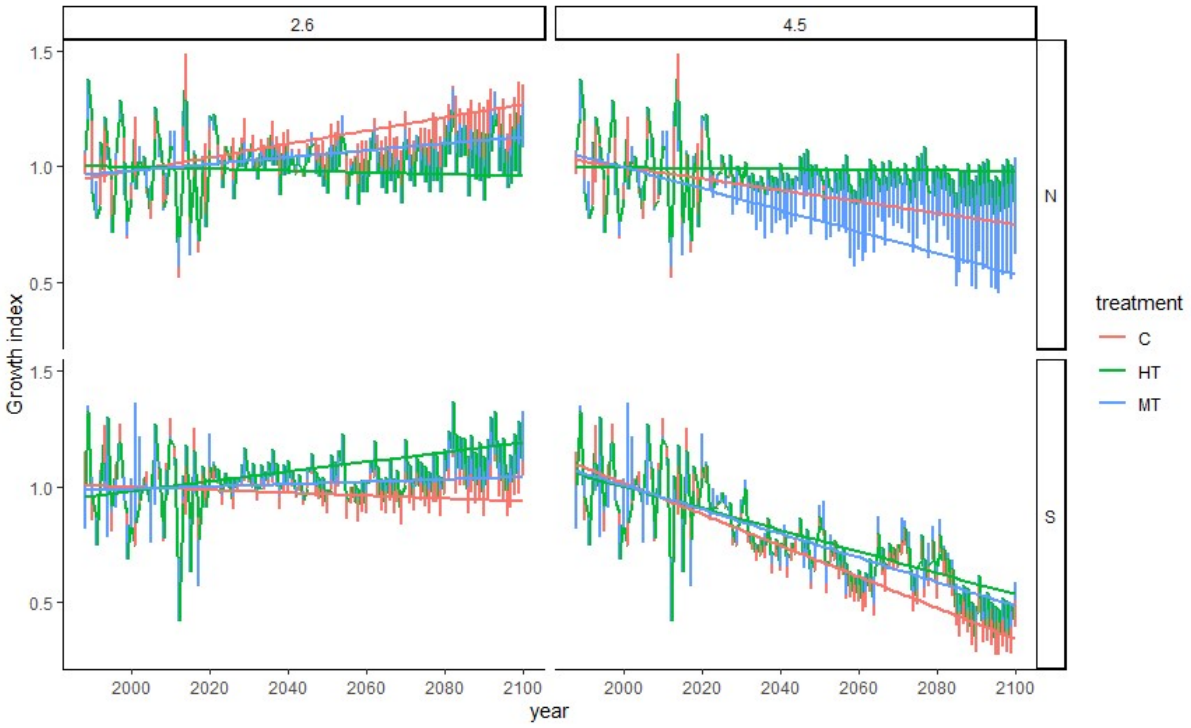

Figure S2. Growth index models and future projections of standardised master chronologies of *Pinus canariensis*, climatic growth models calibrated on the past, used to forecast growth according to climatic scenarios (RCP 2.6 and 4.5) and IPSL-CM5-MR model within CMIP5 at Tenerife (Canarian Islands, Spain). Asterisks indicate significant slopes of the regression lines (* $p < 0.5$, ** $p < 0.01$, ***$p < 0.001$).

Table S1. Forest attribute of the forest types at Tenerife (Canarian Islands, Spain). The study area corresponds to the Pure Canarian pine type. Abbreviations: W=above ground biomass, H=average height, N=tree density, G=basal area, dbh=diameter at breast height, and Fcc=tree cover. Values are means ± Standard error (in brackets). Source Spanish National Forest Inventory [34].

Forest type		W (Mg ha^{-1})	H (m)	N (trees ha^{-1})	G (m^2 ha)	dbh (cm)	Fcc (%)
Fayal-Brezal	Windward (N)	161.24 (20.42)	18.60 (0.99)	453.59 (18.60)	28.89 (2.65)	30.11 (0.37)	78.41 (5.17)
Mixed Canarian pine-Fayal-Brezal	Windward (N)	144.09 (8.58)	18.29 (0.65)	369.34 (20.16)	23.76 (1.34)	29.11 (0.65)	74.24 (2.55)
	Leeward (S)	169.61 (27.08)	18.27 (2.32)	314.84 (42.01)	22.13 (4.42)	27.33 (2.09)	67.50 (4.58)
Pure Canarian pine	Windward (N)	134.93 (2.03)	17.99 (0.17)	342.74 (4.45)	21.95 (0.36)	27.89 (0.15)	73.57 (0.74)
	Leeward (S)	124.62 (3.04)	16.44 (0.25)	359.50 (6.80)	21.22 (0.55)	26.35 (0.23)	70.13 (1.15)

Table S2. Selected LiDAR metrics parameters to run statistical analyses [46].

Abbreviation	LiDAR metric
Elev.minimum	Minimum elevation from all returns of the plot
Elev.maximum	Maximum elevation from all returns of the plot
Elev.mean	Mean elevation from all returns of the plot
Elev.mode	Mode elevation from all returns of the plot
Elev.stddev	Standard deviation of elevations within the plot
Elev.variance	Variance of elevations within the plot
Elev.CV	Coefficient of variation of elevations within the plot
Elev.IQ	Interquartile distance of elevations within the plot
Elev.skewness	Skewness of the elevation from all returns of the plot
Elev.kurtosis	Kurtosis of the elevation from all returns of the plot
Elev.L1	First L-moment of the return heights of the plot
Elev.L2	Second L-moment of the return heights of the plot
Elev.L4	Third L-moment of the return heights of the plot
Elev.L.CV	L-moment coefficient of variation of the return heights of the plot
Elev.L.skewness	L-moment skewness of the return heights of the plot
Elev.L.kurtosis	L-moment kurtosis of the return heights of the plot
Elev.P50	50th percentile of the return heights of the plot
Elev.P60	60th percentile of the return heights of the plot
Elev.P70	70th percentile of the return heights of the plot
Elev.P75	75th percentile of the return heights of the plot
Elev.P80	80th percentile of the return heights of the plot
Elev.P90	90th percentile of the return heights of the plot
Elev.P95	95th percentile of the return heights of the plot
Elev.P99	99th percentile of the return heights of the plot
Canopy.relief.ratio	(mean height- min height) / (max height – min height)
First.returns.above.mean	Number of first returns above the mean height of the plot
First.returns.above.mode	Number of first returns above the mode height of the plot

Table S3. LiDAR models to estimate Basal area (G, m^2 ha^{-1}), Quadratic mean diameter (Dg, cm), and Weibull´s diameter distribution used for forest attribute inventory [43]. See table S2 for LiDAR metrics.

Equations for inventory data update	MAE(%)	MSE(%)
$G_i = 0.49833 * LFCC^{0.63396} * Elev.stddev^{-0.588} * Elev.P70^{0.92804}$	8.25	26.07
$D_g = 3.041193 * Elev.P95^{0.67693} * ABS(Int.L.skewness)^{-0.0731} * ABS(Elev.L4)^{-0.0494}$	2.62	11.71
$f(x/a,b) = \frac{b}{a}\left(\frac{x}{a}\right)\left(\frac{x}{a}\right)^{b-1} e^{-\left(\frac{x}{a}\right)^b}$ **a**=29.72 **b**=4.17		
$a = 7.04692 * Elev.95^{2.552} * Int.kurtosis^{-0.5889} * Elev.90^{-1.9334}$	9.90	12.31
$b = 6.43778 * (Elev.P75 - Elev.P40)^{-0.37467}$	21.61	28.60

Table S4. General characteristics of the *Pinus canariensis* stands at Tenerife (Canarian Islands, Spain) after thinning interventions. H=average height, N=tree density, G=basal area, dbh=diameter at breast height, and Fcc=tree cover. Values are means ± Standard error (in brackets)

Specie	Treat	N (tree ha^{-1})	dbh (cm)	H (m)	G (m^2 ha^{-1})	dbh (cm)	H (m)	N (tree ha^{-1})	dbh (cm)	H (m)
		Post thinning (1988)				**Post thinning (1995)**			**Post thinning 2022**	
Pinus canariensis Windward (N)	C	1099 (122)	26.13 (1.75)	17.40 (1.93)	62.00 (3.72)	28.33 (1.43)	18.97 (1.69)	1056 (93)	33.45 (2.66)	26.73 (2.23)
	MT	741 (147)	29.41 (2.71)	19.30 (1.82)	52.11 (2.91)	32.11 (2.07)	20.23 (2.11)	656 (52)	34.96 (2.59)	31.43 (3.02)
	HT	357 (10)	30.27 (1.86)	17.10 (1.71)	26.32 (2.06)	34.04 (1.89)	19.49 (1.92)	288 (9)	42.22 (2.94)	28.46 (2.45)
Pinus canariensis Leeward (S)	C	1781 (397)	21.86 (1.65)	14.64 (1.75)	65.71 (3.88)	22.96 (1.67)	16.91 (1.05)	1245 (247)	26.91 (2.07)	25.30 (2.99)
	MT	1285 (72)	22.40 (1.82)	14.44 (1.71)	50.64 (2.94)	22.90 (1.73)	16.29 (1.27)	1192 (64)	25.74 (2.83)	23.06 (2.03)
	HT	624(152)	24.64 (1.93)	15.44 (1.76)	28.79 (1.96)	25.77 (1.82)	17.52 (1.59)	624(92)	30.97 (2.94)	24.85 (3.04)

Table S5 Multiple Linear Regression Model (MLRM) outputs of *Pinus canariensis* throughout the thinning treatments (CN, control North side; MTN, moderate thinning North side; HTN, heavy thinning North side, CS, control South side; MTS, moderate thinning South side; HTS, heavy thinning South side) at Tenerife (Canarian Islans, Spain). As fixed effects, we included estimated variables: time (year), precipitation (prcp), mean temperature (temp) and standardized BAIs (Growth index) was fitted as the response variable projections derived from model IPSL.CM5A-MR across two RCP scenarios (2.6 and 4.5).

RCP 2.6		RCP 4.5	
IPSL-CM5A-MR		IPSL-CM5A-MR	
plot	**equation**	**plot**	**equation**
CN	GI= -4.071e+00+ (4.229e-03*year) +(-1.784e-01*temp) + (-3.812e-01*prcp)	**CN**	GI= 6.646e+00+ (-3.957e-03*year) + (1.104e-01*temp) + (4.786e-01*prcp)
MTN	GI= -1.830e+00+ (2.893e-03*year) + (-1.866e-01*temp) + (4.644e-01*prcp)	**MTN**	GI= 1.053e+01+ (-6.385e-03*year) + (1.344e-01*temp) + (1.283e+00*prcp)
HTN	GI= 1.571e+00+ (4.647e-04*year) + (-1.160e-01*temp) + (8.009e-01*prcp)	**HTN**	GI= -7.585e-02 + (6.912e-04 *year) + (-4.190e-02 *temp) + (6.019e-01 *prcp)
CS	GI= 2.248e+00+ (3.409e-04*year) + (-1.279e-01*temp) + (4.755e-01*prcp)	**CS**	GI= 1.617e+01+ (-1.022e-02*year) + (2.578e-01*temp) + (1.103e+00*prcp)
MTS	GI= -2.489e-02+ (1.114e-03*year) + (-7.969e-02*temp) + (2.815e-01*prcp)	**MTS**	GI= 1.396e+01+ (-9.582e-03*year) + (3.217e-01*temp) + (8.285e-01*prcp)
HTS	GI= -2.788e+00+ (3.735e-03*year) + (-2.124e-01*temp) + (6.043e-02*prcp)	**HTS**	GI= 1.119e+01+ (-6.860e-03*year) + (1.641e-01*temp) + (9.475e-01*prcp)

$$Yt = c + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \ldots + \beta_n X_n$$

Table S6 Multiple Linear Regression Model (MLRM) outputs. Asterisks indicate significant slopes of the regression lines (* $p < 0.5$, ** $p < 0.01$, *** $p < 0.001$)

	RCP 2.6					RCP 4.5			
	IPSL-CM5A-MR								
	estimate	**Std. error**	**T value**	**Pr (>t)**		**estimate**	**Std. error**	**T value**	**Pr (>t)**
Intercept	-0.8214	0.2941	-2.793	0.005***	**Intercept**	9.8266	0.4040	24.320	<0.001***
Year	0.0021	0.0001	12.184	<0.001***	**Year**	-0.0061	0.0003	-20.441	<0.001***
Tmed	-0.1501	0.0136	-11.010	<0.001***	**Tmed**	0.1620	0.0177	9.128	<0.001***
Prcp	0.2834	0.0748	3.786	0.00016***	**Prcp**	0.9132	0.0967	9.440	<0.001***
R2	0.2434				**R2**	0.4843			
Adjusted R2	0.24				**Adjusted R2**	0.482			
P value	<0.001***				**P value**	<0.001***			

Table S7. Forest attributes of the *Pinus canariensis* stands at Tenerife (Canarian Islands, Spain) and growth ($m^3\ ha^{-1}\ year^{-1}$) under climatic scenarios (IPSL-CM5 Earth System Model-ESM, RCP 2.6 and 4.5, [42]). Abbreviations: H=average height, N=tree density, G=basal area, dbh=diameter at breast height. Values are means ± SD (in brackets).

Aspect		**H (m)**	**N (trees ha^{-1})**	**G ($m^2\ ha^{-1}$)**	**dbh (cm)**	**IPSL-2.5-2040**	**IPSL-2.5-2060**	**IPSL-4.5-2040**	**IPSL-4.5-2060**
						Growth ($m^3\ ha^{-1}\ year^{-1}$)			
Windward (N)	High density	20.10(0.45)	553.64(0.45)	33.35(0.45)	28.25(0.45)	**8.34(0.47)**	**7.98(0.47)**	**6.11(0.47)**	**5.75(0.48)**
	Middle density	19.14(0.20)	387.57(0.20)	25.65(0.20)	28.72(0.20)	7.74(0.21)	7.08(0.20)	5.55(0.20)	4.60(0.21)
	Low density	14.61(0.28)	177.12(0.28)	10.53(0.28)	26.33(0.28)	4.84(0.29)	4.44(0.29)	5.09(0.29)	4.89(0.29)
Leeward (S)	High density	19.29(0.33)	548.69(4.05)	32.15(0.54)	27.41(0.28)	**6,87(0.07)**	6.24(0.14)	**4.46(0.13)**	3.47(0.09)
	Middle density	17.79(0.32)	383.98(4.34)	24.09(0.59)	27.62(0.29)	6,83(0.07)	**6.56(0.12)**	4.44(0.11)	**3.85(0.13)**
	Low density	11.82(0.35)	166.29(5.61)	8.03(0.40)	22.83(0.48)	3,96(0.13)	3.63(0.12)	3.11(0.12)	2.81(0.08)