

Supplementary Material

Assessment of Future Land Use/Land Cover Scenarios on the Hydrology of a Coastal Basin in South-Central Chile

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Supplementary Material S1: LULC changes for the references years 2008 and 2015.

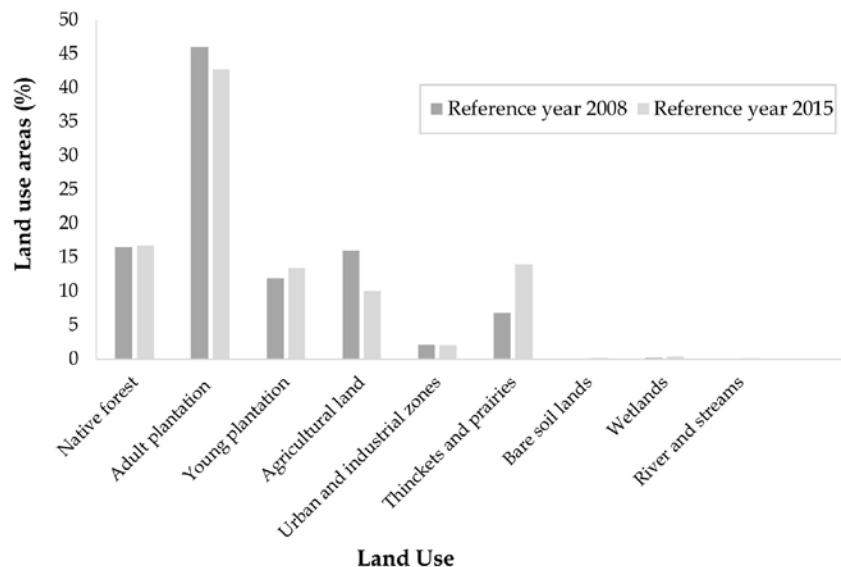


Figure S1. Percentual comparison of LULC areas for references years 2008 and 2015, based on CONAF.

Table S1. Percentual comparison of LULC areas for references years 2008 and 2015, based on CONAF.

LULC	Year 2008 (%)	Year 2015 (%)
Native forest	16.54	16.79
Adult plantation (non-native forest)	46.06	42.75
Young plantation (non-native forest)	11.93	13.46
Agricultural land	16.03	10.07
Urban and industrial zones	2.19	2.12
Thickets and prairies	6.83	13.98
Bare soil lands	0.11	0.26
Wetlands	0.23	0.40
River and streams	0.08	0.16

Supplementary Material S2: Calibration parameters for SWAT hydrological model.

Table S2. Parameters used in the calibration process.

Parameter		Description	Range	2003	2004	2005	2006	2007	Average
MGT1	CN2	SCS initial runoff curve number for moisture condition II	-	-85%	-80%	-62%	-62%	-80%	-74%
	GW_DELAY	Groundwater lag time (days)	[0 - 400]	45	10	40	40	10	29
	ALPHA_BF	Base flow alpha factor (days)	[0,1 - 0.3] [0.9 - 1]	0.1	0.95	0.2	0.2	0.9	0.47
	GWQMN	Threshold water depth in a shallow aquifer required for backflow to occur (mm H ₂ O)	[0 - 5000]	250	0.1	7	7	1	53.02
GW	GW_REVAP	“Revap” coefficient of groundwater	[0.02 - 0.2]	0.02	0.02	0.05	0.05	0.05	0.038
	REVAPMN	Threshold water depth in a shallow aquifer necessary for “revap” or percolation to the aquifer to occur (mm H ₂ O)	[0 - 500]	250	100	11	11	0.3	74.46
	RCHRG_DP	Percolation fraction of deep aquifer	[0 - 1]	1	0.47	0.5	0.5	0.2	0.534
	HRU_SLP	Average slope of the hillside (m/m)	-	-10%	-50%	92%	92%	2%	25%
	OV_N	Manning's "n" value for overland flow	[0.01 - 0.41]	0.3	0.25	0.41	0.41	0.25	0.324
HRU	CANMX	Maximum awning storage (mm H ₂ O)	[0-100]	10	0	15	15	0	8
	ESCO	Soil evaporation compensation factor	[0.01 -1]	0.4	0.2	0.2	0.2	0.01	0.202
	EPCO	Plant absorption compensation factor	[0.01 -1]	0.7	0.1	0.8	0.8	1	0.68
	SOL_Z1	Depth from the soil surface to the bottom of the layer (mm)	-	-71%	-81%	-70%	-70%	-81%	-75%
	SOL_BD1	Bulk density (Mg/m ³ or g/cm ³)	[1.1 -1.9]	1.39	1.9	1.29	1.29	1.9	1.554
SOL	SOL_AWC1	Available water capacity of the soil layer (mm H ₂ O/mm of soil)	[0 - 1]	0.4	0.16	0.4	0.4	0.16	0.304
	SOL_K1	Saturated hydraulic conductivity (mm/h)	[0 - 2000]	33	1.75	33	33	1.75	20.5
	CH_N2	Manning's "n" value for the main channel	[-0.01 - 0.3]	0.15	0.3	0.15	0.15	0.3	0.21
RTE	CH_K	Effective hydraulic conductivity in the main channel alluvium (mm/h)	[-0.01 - 500]	1.81	1	1.81	1.81	1	1.486

Where MGT1 corresponds to general management, GW is groundwater, HRU is hydrological response units, SOL is soils and RTE corresponds to main channel.

Supplementary Material S3: Adjutment indicators for the calibration and validation periods.
These parametres were selected in the calibration phase and were applied to both periods.

Table S3. Results of the hydrological model performance for the calibration period.

Calibration (2003-2007)								
Parameter set by year	R ²	Model performance	NS E	Model performance	PBI AS	Model performance	KG E	Model performance
2003	0.96	Very good	0.96	Very good	0.27	Very good	0.98	Very good
2004	0.91	Very good	0.91	Very good	-1.36	Very good	0.95	Very good
2005	0.95	Very good	0.95	Very good	4.38	Very good	0.95	Very good
2006	0.98	Very good	0.97	Very good	-0.27	Very good	0.92	Very good
2007	0.94	Very good	0.92	Very good	-4.76	Very good	0.92	Very good
Mean	0.91	Very good	0.91	Very good	-1.18	Very good	0.94	Very good

Table S4. Results of the hydrological model performance for the validation period.

Validation (2008-2016)								
Parameter set by year	R ²	Model performance	NS E	Model performance	PBI AS	Model performance	KG E	Model performance
2003	0.62	Good	0.65	Good	6.49	Very good	0.74	Satisfactory
2004	0.67	Good	0.53	Satisfactory	-22.98	Satisfactory	0.71	Satisfactory
2005	0.71	Good	0.73	Good	8.74	Very good	0.82	Good
2006	0.71	Good	0.73	Good	8.74	Very good	0.82	Good
2007	0.70	Good	0.38	Unsatisfactory	-13.95	Good	0.66	Satisfactory
Mean	0.75	Good	0.73	Good	-5.67	Very good	0.85	Good

Supplementary Material S4: Water balance results for the years 2015, 2025, 2035 and 2045, for each hydrological component.

Table S5. Water balance results for the years 2015, 2025, 2035 and 2045.

YEAR	ET (mm)	PERC (mm)	SURQ (mm)	LAT_Q (mm)	GW_Q (mm)	WYLD (mm)	DISCH (m ³ /s)
2015	440.61	58.84	285.41	118.08	27.33	463.00	9.96
2025	435.83	74.90	277.48	113.99	34.81	467.30	10.78
2035	442.17	101.49	276.06	83.79	47.12	462.00	10.95
2045	430.71	82.41	274.85	114.18	38.27	472.19	11.00