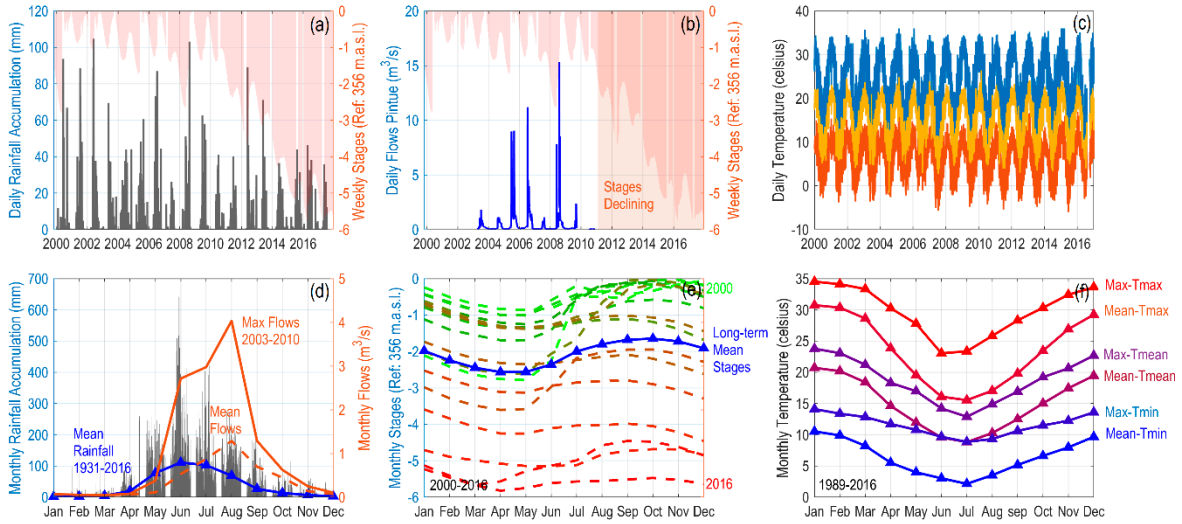
Figure S1. (a) Daily rainfall (mm/d) and the lagoon's water levels between 2000 and 2018. The storm events larger than 40 mm/d are less frequent after 2010; **(b)** Daily streamflow records (m^3/s) for Pintué streamgauge and lagoon's water levels. No records of streamflow at Pintué have been available since 2011; **(c)** Daily Maximum (blue), average (yellow), and minimum (red) temperatures for the Aculeo Basin; (d) Monthly rainfall (mm) accumulation (left-axis), and monthly streamflow (m^3/s) at Pintué streamgauge (right-axis); **(e)** Average Monthly Water Levels at Aculeo Lagoon (meters); (f) Monthly maximum and average temperature at Aculeo Basin.



water

MDPI

Table S1. Geodatabase used in this study.

Data	Type	Period	Temporal Resolution	Spatial Resolution	Source
Rainfall Accumulation	Pluviometers	1930-2018	Daily	4 locations	DGA
Evapotranspiration	Evaporimeters	2006/2012/2018	Annual	30 meters	DGA
Streamflow	Streamgauges	2003-2012	Daily	1 location	DGA
Lagoon Stage	Staff gage	1999-2017	Weekly	1 location	Local Water User
Stratigraphy	Boreholes	Multiple	One-Time	57 locations	DGA
Groundwater Levels	Boreholes	Multiple	Monthly	57 locations	DGA
Vertical Electrical Sounding	Sounding Points	2018	One-Time	12 locations	GEOEXPLORACIONES
Land Use	Land Use	2006/2012/2018	One-Time	30 meters	LANDSAT
Digital Elevation Model	Topography	2014	One-Time	30 meters	NASA

Table S2. Simplified Categories of Lithographic Sedimentation and Rock Basement Used in the Development of the Aculeo Geological Model (AGM).

Texture	Category	Composition	Hydraulic Conductivity (m/d)
Fine to very Fine	Very Fine	clay, limo-arcilloso y arcilla limosa	$\leq$ 0.079056
	Fine	Incluye franco-arcilloso-arenoso, franco-limoso-arcilloso y franco-arcilloso	$\leq$ 0.243648
Medium	Medium Fine	Incluye arcilla-arenosa, franco-limoso, limo-franco	$\leq$ 0.792288
	Medium Coarse	Incluye franco-arenoso	$\leq$ 2.43864
	Coarse	Incluye arenas y arenas finas	$\leq$ 7.926336

Coarse to very Coarse	Very Coarse	Incluye arenas gruesas, arenas muy gruesas y coca fracturada	12.194496 - 25.92
Rock basement	Rock	Rock	$\leq$ 0.0181

Table 3. Summary of the Main MODFLOW Packages Used in This Study.

Name	Package Name	Type of Package	Description
FHB	Flow and Head Boundary Package	Specified fluctuation boundary	Flow and head are used as boundary condition
RCH	Recharge Package	Specified fluctuation boundary	Utilizes recharge values in the simulation domain
WEL	Well Package	Specified fluctuation boundary	Utilizes groundwater pumping values from wells in the simulation domain
EVT	Evapotranspiration Package	Head-dependent fluctuation boundary	Utilizes evapotranspiration values in the simulation domain
LAK	Lake Package	Head-dependent fluctuation boundary	Utilizes the parameters of the lagoon and its interaction with the groundwater
STR	Stream Package	Head-dependent fluctuation boundary	Utilizes the parameters associated to the presence of streams in the simulation domain
HOB	Head Observation Package	Observation process input files	Utilizes head observation to calibrate the model
NWT	Solver Package	Newton Solver	A Newton formulation for MODFLOW 2005.