

Basin Risk Indicators - Descriptions, Sources and Links

Risk type	Risk category	#	Risk indicator	Description	Source	Link
Physical Risk	1. Water Scarcity	1.0	Aridity Index	The Aridity Index CAMELS-CL was calculated as the ratio between the daily mean PET and the daily mean precipitation.	Alvarez-Garreton, C., Mendoza, P. A., Boisier, J. P., Addor, N., Galleguillos, M., Zambrano-Bigiarini, M., ... & Ayala, A. (2018). The CAMELS-CL dataset: catchment attributes and meteorology for large sample studies-Chile dataset. Hydrology and Earth System Sciences, 22(11), 5817-5846.	https://doi.pangaea.de/10.1594/PANGAEA.894885
		1.1	Degree of Human Intervention	The Degree of Human Intervention was calculated as the ratio between the surface annual flow allocated as superficial water rights and the annual mean runoff at the same catchment point. The Degree of Human Intervention indicates how much of the annual mean volume of runoff generated in the catchment point corresponds to water allocated in consumptive superficial water rights.	Alvarez-Garreton, C., Mendoza, P. A., Boisier, J. P., Addor, N., Galleguillos, M., Zambrano-Bigiarini, M., ... & Ayala, A. (2018). The CAMELS-CL dataset: catchment attributes and meteorology for large sample studies-Chile dataset. Hydrology and Earth System Sciences, 22(11), 5817-5846.	https://doi.pangaea.de/10.1594/PANGAEA.894885
		1.2	Baseline Water Stress	See Global Documentation on Indicators, Sources and Description		
		1.3	Blue Water Scarcity	See Global Documentation on Indicators, Sources and Description		
		1.4	Available Water Remaining (AWARE)	See Global Documentation on Indicators, Sources and Description		
		1.5	Drought Index	This index informs about the current drought situation in Chile combining indicators of meteorological drought (Standardized Precipitation Index, SPI), hydrological drought (Standardized Flow Index, SFI) & agricultural drought, estimated through the Normalized Difference Vegetation Index (NDVI).	ENCCRV (2016). INFORMATIVE NOTE 05. National Strategy on Climate Change and Vegetational Resources. Santiago de Chile (P. 28-29).	https://www.enccrv-chile.cl/index.php/en/downloads/publicaciones/348-mapa-indice-de-sequi-a-2015-por-comuna
		1.6	Projected Change in Drought Occurrence	See Global Documentation on Indicators, Sources and Description		
2. Flooding		2.1	Hydric Excess	The Hydric Excess indicator considers the probability of natural disasters related to the hydric	Escenarios Hídricos 2030. (2018).	https://www.escen

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				excess (flooding), both of geological, hydro-meteorological or climatic origin. It is based on information related to natural disasters associated with floods, alluvium & tsunamis in a timeframe between 1907 & 2017. The minimum work scale considered the county-level political division for the Hydric Excess analysis.	Radiografía del Agua: Brecha y Riesgo Hídrico en Chile. Fundación Chile, Santiago, Chile.	arioshidricos.cl/multimedia/
		2.2	Projected Change in Flood Occurrence	See Global Documentation on Indicators, Sources and Description		
	3. Water Quality	3.1	Surface Water Quality Index	This index informs levels of water quality in a simplified way, englobing in this index the most important parameters negatively affecting water quality. This Index was built based on general (pH, dissolved oxygen, electrical conductivity and chemical oxygen demand) and specific (metals, metalloids, nitrate and nitrite) chemical parameters. The comparison and valuation of these parameters defined were normalized to be assessed and integrated to the final quality index.	Escenarios Hídricos 2030. (2018). Radiografía del Agua: Brecha y Riesgo Hídrico en Chile. Fundación Chile, Santiago, Chile.	https://www.escenarioshidricos.cl/multimedia/
	4. Ecosystem Services Status	4.1	Terrestrial Ecosystems	This indicator describes risk levels for environmental degradation over the next 50 years. It is an estimation based on the percentage of the area by vegetation type affected by a different severity level of bioclimatic hydric stress.	Pliscoff, P. (2015) Aplicación de los criterios de la Unión Internacional para la Conservación de la Naturaleza (IUCN) para la evaluación de riesgo de los ecosistemas terrestres de Chile. Informe Técnico elaborado por Patricio Pliscoff para el Ministerio del Medio Ambiente. 63p. Santiago, Chile.	https://mma.gob.cl/
		4.2	Catchment Ecosystem Services Degradation Level	See Global Documentation on Indicators, Sources and Description		
		4.3	Projected Impacts on Freshwater Biodiversity	See Global Documentation on Indicators, Sources and Description		
Regulatory Risk	5. Enabling Environment	5.1	Water Strategy	The water strategy risk indicator is based on inquiry related to the existence of a water strategy, both at the national, local or basin level. This indicator was built incorporating information about drought management and flood plans from the Voluntary Watershed Management Agreements and Tsunami Flood Maps from the CITSU Project.	SHOA. (2019). Shoa :: CITSU.	http://www.shoa.cl/php/citsu.php
		5.2	Sophistication of Legal Framework	The Sophistication of Legal Framework Risk Indicator is based on research to determine the level of sophistication and clarity of water-related legal framework in Chile. The underlying data for this risk indicator is based on information about legal restrictions and limitations of water use framework in Chile, for both superficial and subterranean water.	DGA. (2019). Ministerio de Obras Públicas - Dirección de General de Aguas.	http://www.dga.cl/limitacionrestriccionagua/Paginas/default.aspx
		5.3	Implementation Status of Water	See Global Documentation on Indicators, Sources and Description		

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			Management Plans (SDG 6.5.1)			
	6. Institutions & Governance	6.1	Corruption Perceptions Index	See Global Documentation on Indicators, Sources and Description		
		6.2	Freedom in the World Index	See Global Documentation on Indicators, Sources and Description		
		6.3	Stakeholder Platform	The Stakeholder Platform Risk Indicator is based on research to determine the existence and level of an official forum or platform in which stakeholders come together to discuss water-related issues. The underlying data for this risk indicator is based on information about territorial scope of Voluntary Watershed Management Agreements. The scores have been defined in accordance to the existence and effectiveness of watershed management agreements. Due to the low representation of these fora in the country, the scores take categories related to the existence and progress on implementation of watershed management agreements.	ASCC. (2019). Agencia de Sustentabilidad y Cambio Climático.	http://www.agencia.sustentabilidad.cl/productosyservicios/realizarDenuncia/Paginarios/realizar/default.aspx?voluntarios
	7. Management Instruments	7.1	Enforcement of Legal Framework	In order to acknowledge risks due to lack enforcement of Water-related Legal Framework, the underlying data for this Indicator is based on information related to the number of infractions in the Water Code12 (complaints and inspections) at watershed basin level, in a period between 2014 to 2018. Due to the qualitative character of the information and the risk level varies greatly across different watershed basins, the risk scores were established through the natural breaks method (Jenks optimization algorithm). The raw data use for this analysis corresponds to the number of complaints with a procedure state cataloged as “resolved” and with the denomination “final decision received”, and as such a clear infraction.	DGA. (2019). Ministerio de Obras Públicas - Dirección de General de Aguas.	http://www.dga.cl/productosyservicios/realizarDenuncia/Paginarios/default.aspx
		7.2	Status of Groundwater Monitoring	The Groundwater Monitoring was established as a proxy to determine the groundwater risk at a watershed level. The indicator uses the number of groundwater monitoring stations from the National Hydrometric Net by watershed.	DGA. (2019). Ministerio de Obras Públicas - Dirección de General de Aguas.	http://www.dga.cl/estudiospublicaciones/mapoteca/Paginas/default.aspx#och
		7.3	Density of Runoff Monitoring Stations	Density of Runoff Monitoring stations was established as a proxy to determine the risk related to information on runoff levels at a watershed level. The indicator uses the number of runoff monitoring stations from the National Hydrometric Net by watershed basin.	DGA. (2019). Ministerio de Obras Públicas - Dirección de General de Aguas.	http://www.dga.cl/estudiospublicaciones/mapoteca/Paginas/default.aspx#och
	8. Infrastructure & Finance	8.1	Access to Safe Drinking Water	The underlying data for this risk indicator is based on information from the Census of Population and Housing in 2017 related to the source of water used in homes by county. The raw data that was analysed corresponds to the number of homes by county currently connected to the safe public drinking water system.	INE. (2017). Instituto Nacional de Estadísticas REDATAM Procesamiento y disseminación.	https://redatam-ine.ine.cl/redbin/RpWebEngine.exe/Portal?BASE=CENSO_2017&lang=esp
		8.2	Access to Sanitation	This risk indicator is based on an information cross related with the total population within the operational territory of sanitary concessions, whose wastewater collected receive treatment, and the total habitants by county informed by the Census of Population and Housing in 2017.	SISS. (2017). Informes sector sanitario.	http://www.siss.gov.cl/586/w3-propertyvalue-6415.html

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		8.3	Financing for Water Resource Development and Management (SDG 6.5.1)	See Global Documentation on Indicators, Sources and Description		
Reputational Risk	9. Cultural Importance	9.1	Cultural/Religious Water Roles	Due to the importance of the role of water to the local indigenous culture, the Cultural and/or Religious Water Role Risk Indicator is based on information related to the location of Indigenous Communities and Indigenous Development Areas around the country. The existence of Indigenous Communities and/or delimitations of Indigenous Development Areas on a watershed are scored as "Water is considered very important by the local culture and/or religion".	CONADI. (2019). Sistema Integrado de Información CONADI - SIIC.	http://siic.conadi.cl/
	10. Biodiversity Importance	10.1	Freshwater Endemism	See Global Documentation on Indicators, Sources and Description		
		10.2	Freshwater Biodiversity Richness	See Global Documentation on Indicators, Sources and Description		
	11. Media Scrutiny	11.1	National Media Coverage	The National Media Coverage Risk Indicator is based on a qualitative media coverage search about news that informed about concerning situations related to the water conflict on the Google News Platform, where a search was made for Chile with the following terms: Water + Topic + Region, for each of the 16 regions in Chile. The topics listed in the media coverage search are related with water scarcity, flooding, water contamination and water use conflict.	Google News Chile	https://news.google.cl/
			Global Media Coverage	See Global Documentation on Indicators, Sources and Description		
12. Conflict	12.1	Conflict News Events	See Global Documentation on Indicators, Sources and Description			
		12.2	Hydro-political Likelihood	See Global Documentation on Indicators, Sources and Description		