

CHILE: THE DROUGHT, SEA WATER DESALINATION AND ITS REGULATION

I. Background

In the face of the water crisis in Chile and the world, where fresh water reserves decrease rapidly, this mechanism -desalination- for obtaining potable or industrial water is gaining strength, anticipating a future where it is possible that the sea is the main source of water for agricultural and human consumption. Given this, we wonder how and who regulates the use of seawater? Although it seems inexhaustible - it covers 70% of the earth's surface¹- it is not, and its regulation is fundamental for environmental preservation and sustainable development. In some cities in northern Chile (for example, Antofagasta and Tocopilla), about 80% of the drinking water consumed comes from a desalination² plant..

II. Legal nature of seawater and desalinated water

The territorial sea of the Chilean coast is, unquestionably, a national good for public use (hereinafter, "BNUP" for its name in Spanish "Bien Nacional de Uso Público"), established in Article 589 of the Chilean Civil Code. However, what about the seawater - and its legal nature - once it goes through a desalination process? There exist many contrarious opinions: some are inclined to regulate it according to private regulations, considering that it is artificial water that is incorporated into the property through accession (Article 662 of the Chilean Civil Code)³. Whereas others believe that, the desalinated water keeps its character as Public Good, implying its own challenges in terms of regulation for its use.

The question is if the desalination process generates the denaturation of seawater. If it does, we understand its alienation from the regime of public goods. Otherwise, it will curse within it⁴. Depending on which opinion we follow, infinite consequences will be derived, especially relevant to the use and ownership of desalinated water, and therefore, to the industry, population, and environment.

¹ Source: USGS: https://www.usgs.gov/special-topic/water-science-school/science/how-much-water-there-earth?qt-science_center_objects=0#qt-science_center_objects

² Source: El Desconcierto: <https://www.eldesconcierto.cl/2020/01/02/el-costo-ambiental-de-desalinizar-agua-de-mar-en-el-norte-de-chile/>

³ Source: Biblioteca Congreso Nacional: https://www.bcn.cl/obtienearchivo?id=repositorio/10221/27303/2/Informe_Propiedad_de_Agua_Desalada.pdf

⁴ Source: Repositorio Universidad de Chile: <http://repositorio.uchile.cl/bitstream/handle/2250/151689/R%C3%A9gimen-jur%C3%ADdico-de-la-desalaci%C3%B3n-de-agua-de-mar-en-Chile-el-car%C3%A1cter-de-bien-de-dominio-p%C3%BAblico-del-agua-de-mar-y-del-borde-costero.pdf?sequence=1&isAllowed=y>

In January 2018, the Senate had to deal with a project (Bulletin No. 11.608-09, on the use of seawater for desalination), which seeks for desalinated water produced in plants to become a national good for public use. This project, if realized, would imply a disincentive to the investment of individuals in this type of technologies. At the moment, the project is still in the First Constitutional Procedure, and given the social demands that have taken relevance in our country, it has not had major advances since the last semester of 2019.

It is also important to highlight that, through Bulletin 6124-09 it was voted the idea to incorporate water - as a whole- into the Constitution, so that it would become a national good of public use, consecrated in the Constitution. On December 7, 2019, the Senate (as the First Constitutional Procedure) rejected the idea of legislating the constitutional reform project “on water domain and use”, the necessary two-thirds majority failing by five votes. The Project sought to perpetuate the country's waters - in any of its states - as BNUP. Also, to rule the treatment of water resources by law, limiting concessions to individuals (temporarily, assigning specific purposes, and subjecting them to the payment of fees), guaranteeing the prioritization of water uses, and incorporating the protection resource (Recourse of protection?) when the right to water⁵ is affected.

Although our current system recognizes the waters as a BNUP in article 595 of the Chilean Civil Code, this project, if approved, would have raised its consecration to the Constitutional order. This probably will happen, if Chile decides to approve the elaboration of a new Constitution in the near future.

III. Current desalinated water volume in Chile

In March 2019, there were eleven industrial-scale desalination plants in Chile, with ten projects at different stages of evaluation. The operating plants at that date would produce a total of 5,868 liters of desalinated water per second, which is expected to increase by 116.5% considering future projects⁶.

IV. Advantages and disadvantages of desalination

Chile has a coast that extends over 6.435 km⁷ throughout the whole country, as well as we have the most arid desert in the world (Atacama Desert). Fresh water is obviously a scarce commodity in the north of our country, but is also increasingly becoming a scarce commodity in southern Chile, and the rest of the world as well. One of the ways to obtain fresh water in these regions has been the use of desalinated seawater. This industrial process allows the extraction of salt and other polluting elements from the seawater, transforming it

⁵ Source: CNN Chile: https://www.cnnchile.com/pais/senado-rechaza-proyecto-que-buscaba-consagrar-el-agua-como-un-bien-de-uso-publico_20200108/

⁶ Source: Deswater: https://www.deswater.com/DWT_articles/vol_171_papers/171_2019_93.pdf

⁷ Source: Gobierno de Chile: <https://www.gob.cl/nuestro-pais/>

into water suitable for human consumption, or for productive uses such as agriculture or mining⁸.

The first desalination plant was built in Chile in 1872⁹. Today we find the largest desalination plant in Latin America in Antofagasta, producing 1,056 liters of desalinated water per second,¹⁰ supplying about 80% of the drinking water used in the city. According to the 2017 CENSUS, the city has 361,873 inhabitants (marking a growth of 21.88% compared to 2002¹¹). However, this operation is complex, since it requires the management of the brine produced, whose salinity is significantly higher than the average of coastal marine ecosystems, and can have different temperature, pH and chemical components (typical of the purification process) to the sea to which it is returned to¹².

V. Energy Consumption

The most important limiting factor to desalination is that it requires a lot of energy, for its production, as well as for its subsequent "pumping" to the place of consumption¹³. The desalination process requires the use of large amounts of energy, which make up around 70% of the cost of each liter of water produced (taking as a reference "La Chimba" plant in Antofagasta), whereas only 9% of the costs of conventional water treatments are attributed to energy consumption.¹⁴ However, energy costs have been significantly reduced during the last 30 years, reflecting an energy cost 3 times lower, according to the note by Martins on the BBC¹⁵.

VI. Desalination and mining

There is a strong correlation between desalination and mining in Chile, which is reflected upon the fact that 70% of the total capacity of desalination plants in operation and development in Chile, goes to the mining industry¹⁶. However, the national mining industry

⁸ Source: Repositorio Universidad de Chile:

<http://repositorio.uchile.cl/bitstream/handle/2250/151689/R%C3%A9gimen-jur%C3%ADdico-de-la-desalaci%C3%B3n-de-agua-de-mar-en-Chile-el-car%C3%A1cter-de-bien-de-dominio-p%C3%BAblico-del-agua-de-mar-y-del-borde-costero.pdf?sequence=1&isAllowed=y>

⁹ Source: iagua: <https://www.iagua.es/noticias/aguada-garcia-durango/15/10/23/agua-y-sal-historia-desalacion>

¹⁰ Source: The Guardian: https://www.theguardian.com/cities/2020/jan/02/the-salt-they-pump-back-in-kills-everything-is-the-cost-of-chiles-fresh-water-too-high?CMP=Share_iOSApp_Other

¹¹ Source: Repores Comunales Biblioteca Congreso Nacional:

https://reportescomunales.bcn.cl/2017/index.php/Antofagasta#Poblaci.C3.B3n_total_Censo_2002_y_Censo_2017

¹² Source: El desconcierto: <https://www.eldesconcierto.cl/2020/01/02/el-costo-ambiental-de-desalinizar-agua-de-mar-en-el-norte-de-chile/>

¹³ Source: BBC: <https://www.bbc.com/mundo/noticias-39332148>

¹⁴ Source: The Guardian: https://www.theguardian.com/cities/2020/jan/02/the-salt-they-pump-back-in-kills-everything-is-the-cost-of-chiles-fresh-water-too-high?CMP=Share_iOSApp_Other

¹⁵ Source: BBC: <https://www.bbc.com/mundo/noticias-39332148>

¹⁶ Source: Deswater: https://www.deswater.com/DWT_articles/vol_171_papers/171_2019_93.pdf

does not require high quality water for its processes, so that in some cases seawater, or partially processed seawater, has been used in order to reduce its negative externalities. Nevertheless, this alternative is still in its early stages of development, and brings along problems due to its high corrosive level, its higher density (and therefore, higher energy expenditure for transportation to mining companies), and the lower yield of recovery of some materials due to the presence of magnesium ions in seawater¹⁷.

VII. Regulations relevant to desalination in Chile

The desalination plants are developed at the Coastline, with respect to which in December 1994 a Supreme Decree established the National Policy of Use of the Coastline¹⁸, creating a commission to look after an efficient, organic use, making compatible the different uses of the coastline¹⁹. However, this theoretical ideal has not been reflected in practice, where the coastline is subject to various regulations, with more than 10 sectoral organizations having a say, amongst which we find the DIRECTEMAR, the Chilean Navy, the Undersecretary of Fishing, Sernapesca, the Direction of Port Works, the Direction of Port Works..

This regulatory, a-systemic and inorganic disorder represents a problem when thinking about the development of the desalination industry. It is difficult for anyone who wants to boost this industry lacking clear parameters to adhere to, and it represents an imminent risk to the environment, as there is no eco-systemic vision for the regulation of the coastline, of marine waters, and their consequent effects on the marine ecosystem.

According to the Law of Maritime Concessions, the Undersecretary of the Navy of the Ministry of Defense is empowered to grant the private use of the beaches and public lands, as well as the parts of water inside and outside the bay. The Ministry of Defense grants the concession by Supreme Decree, and it establishes in it the rights and obligations of the concessionaires. Thus, anyone who wants to establish a desalination plant must have a maritime concession for the extraction of seawater and the facilities they require, even if the plant is not located within the coastal strip.

¹⁷ Source: Deswater: https://www.deswater.com/DWT_articles/vol_171_papers/171_2019_93.pdf

¹⁸ Source: Revista Marina: <https://revistamarina.cl/revistas/1997/2/patillo.pdf>

¹⁹ Source: Directemar: https://www.directemar.cl/directemar/site/artic/20190506/asocfile/20190506112004/ds_475_politica_uso_bor_de_costero.pdf

¹⁹ Source: Deswater: https://www.deswater.com/DWT_articles/vol_171_papers/171_2019_93.pdf

¹⁹ Source: Revista Marina: <https://revistamarina.cl/revistas/1997/2/patillo.pdf>

¹⁹ Source: Directemar: https://www.directemar.cl/directemar/site/artic/20190506/asocfile/20190506112004/ds_475_politica_uso_bor_de_costero.pdf

With respect to the Resolution of the Environmental Qualification (hereinafter, "RCA" for its name in Spanish), the desalination projects developed in our country enter the System of Environmental Impact Assessment (hereinafter, "SEIA"). That way, desalination plants in Chile usually have an RCA, after being evaluated according to what is established in the Article 10° of the Environmental Chilean Law "Ley de Bases del Medio Ambiente".²⁰

In addition, these desalination projects will require Sectorial Environmental Permits (hereinafter, "PAS" for its name in Spanish), according to the same regulations, such as the PAS for the discharge of harmful or dangerous substances into the water, the PAS for the construction of aqueducts or submarine emissary (the latter will depend on the capacity of the aqueduct), among others.

In addition to having a maritime concession, and if necessary a Resolution of Environmental Qualification favorable to its operation, they must comply with all regulations relevant to the particular project. Considering, amongst others, its geographical location, use and volume that the administrative authorities have previously stated, as well as any other administrative authority that regulates the subject. The above does not fully reflect the laws, regulations and administrative authorities that must cooperate within the framework of the development of a desalination plant, which makes its development even more complex. Therefore, it is natural to wonder if a modern and systemic regulation would be desirable.

VIII. Comparative Law

Israel

In 2005, Israel faced a drought that would last seven years, drying up and affecting the quality of its main water sources, forcing a change in its policies on the use of this resource. Today, more than 50% of the water used in homes, agriculture and industry is being produced artificially. The solution to water scarcity was achieved through a plan that fought on two fronts: increasing the demand for water, and reducing its consumption. Desalination was the focus through which Israel achieved the first of these objectives, while the second was reinforced by increasing the costs of water, hand in hand with a campaign to reduce consumption in homes, and by reusing wastewater for agriculture. With regard to ownership of desalinated water, Israel maintains it as public property, as the legislation establishes that all water sources - without differentiating according to whether they are marine or continental - are public. In turn, desalination infrastructures are considered as national infrastructure, which are declared of national importance, favoring the consideration of desalinated water as public.

²⁰ Section 10.- The projects or activities likely to cause environmental impact, in any of its phases, which must be submitted to the environmental impact assessment system, are the following: o) Environmental sanitation projects, such as sewage and drinking water systems, treatment plants of water or solid waste of household origin, sanitary landfills, submarine emissaries, treatment systems and disposal of liquid or solid industrial waste.

Australia

With Australia being one of the driest countries of the world, desalinated water is nowadays one of the biggest sources of potable water in the coastal cities, such as Melbourne, Sidney, Perth and others.

In this manner, desalination activities in Australia are regulated by each state, but always have to comply with certain federal and national regulations, especially in environmental matters²¹. Following this, the federal regulations do not recognize desalination as alternative water supply with regard to human consumption, but several states consider it as alternative source.

Therefore, like it is the matter of fact in the state of Victoria, one needs to acquire various authorizations in order to install desalination plants in coastal areas. As an example, one has to comply with the *Coastal Management Act*, which requires the written approval from the Ministry of Planning in order to make use of the majority of land within the 200 meters measured from the high tide line and the seabed of the coastal waters of the State of Victoria.²²

On the other hand, it is important to consider water politics. At the end of the nineties, politicians promoted desalination to encounter the harsh draughts, but once they had been combatted, the plants would not be used anymore. Logically, there has been opposition to the installation of the desalination plants on the coast of the Victoria state, due to the high costs such projects imply compared to other alternatives, such as the use of rainwater tanks at household level. Additionally, these projects need an evaluation of their environmental impact, complying with a series of regulations, such as the “*Environment Effects Act*”²³ or the “*Environment Protection (Scheduled remises and Exceptions) Regulations*”²⁴.

For these effects, in order to install a desalination plant in Australia, firms have to comply with a variety of regulations and permits, as well as obtaining an operational license, granted by the environmental authority, which is guaranteeing that the projects do not generate environmental impact.

Case California - USA

There is discussion in the United States, as well as in Chile, regarding the need for special permits to carry out desalination activities, and regarding the ownership of the desalinated

²¹ For example the “*Environment Protection and Biodiversity Conservation Act*” de 1999, and the “*Australian and New Zeland Guidelines for Freshand Marine Water Quality*”, of 2000.

²² Coastal Management Act de 1995, available in <https://www.legislation.qld.gov.au/view/pdf/inforce/current/act-1995-041>

²³ Environment Effects Act, de 1978, available in [http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/LTObject_Store/LTObjSt2.nsf/DDE300B846EED9C7CA257616000A3571/8F9AD5B595AECA4CCA257761001EE24D/\\$FILE/78-9135a024.pdf](http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/LTObject_Store/LTObjSt2.nsf/DDE300B846EED9C7CA257616000A3571/8F9AD5B595AECA4CCA257761001EE24D/$FILE/78-9135a024.pdf)

²⁴ Environment Protection (Scheduled remises and Exceptions) Regulations, de 1987, available in: [http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubStatbook.nsf/93eb987ebadd283dca256e92000e4069/C6F01585296317ADCA25813F001E0CC5/\\$FILE/17-045sra%20authorised.pdf](http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubStatbook.nsf/93eb987ebadd283dca256e92000e4069/C6F01585296317ADCA25813F001E0CC5/$FILE/17-045sra%20authorised.pdf)

water once the seawater is desalted. Traditionally, the extraction of seawater has been based on the principle of "littoral rights", which are those of coastal owners of lakes or oceans, under which no special permits would be required for desalination activity. However, in the state of California, the California Coastal Act is the regulatory body that regulates the coastal ecosystem, so that every facility - including desalination plants - must have a special permit called a "coastal-development permit", which evaluates how the project conforms to the principles of the California Coastal Act. -Hereby considering certain parameters that evaluate the project in an organic way (considering, for example, that they are installed in areas where adequate facilities already exist, that other priority uses of the coast are not affected the impacts of the work with respect to population growth, etc.).

However, considering the proper seawater **extraction**, the mayor doctrine understands seawater as *public trust*, which means it forms part of the public common goods of each state. These collective goods are not susceptible to being disposed of or used in such a way as to violate that situation, so that even if rights were granted to extract seawater for desalination, those rights would be inherently revocable. The aforementioned has generated objections to the trade of desalinated water, considering that the act of desalination violates the *public trust* doctrine, as it would mean a consumptive use of the treated water.

Therefore, according to the majority opinion, the water keeps its character as *public trust*, although the salt has been removed, including considering the added value which fosters the desalination of the water. Recognizing the desalination owner only as a "transporter" of the desalinated fresh water, rather than a real owner.

IX. National strategy for adaptation to water resources

The Chilean Department of Climate Change of the Environmental Ministry developed its second National Climate Change Action Plan, which sets the objectives of adaptation to the climate phenomenon for the years 2017-2022, establishing an instrument that integrates and guides the actions to take as a country in relation to climate change²⁵.

Hand in hand with his Action Plan, the Executive Secretary for the Environment and Territory, of the General Directorate for Water and the Directorate for Hydraulic Works are collaborating on the elaboration of a national plan of adaptation of water resources for 2021. This plan sets forth as one of the major goals the obtaining of resources from new sources, as mentioned in the first place, desalination plants²⁶.

It would be interesting to consider within this plan a modernization of the regulation related to desalination plants. Taking into account the multiplicity of factors that are combined in

²⁵ Source: Ministerio Medio Ambiente: <https://mma.gob.cl/cambio-climatico/plan-de-accion-nacional-de-cambio-climatico-2017-2022-pancc-ii/>

²⁶ Fuente: Ministerio Medio Ambiente: <https://mma.gob.cl/cambio-climatico/plan-de-adaptacion-para-los-recursos-hidricos/>

them by giving an organic/systemic approach to regulation, and re-evaluating the administrative authorities involved in the required permits, considering the fast development of this industry that has been set as a priority axis to face climate change.

[Mirco Hilgers Gutschendies](#)