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Mining

Fourth Edition

Contributing Editor
Ciaran Boyle

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Publisher
Edward Costelloe
edward.costelloe@lbresearch.com

Subscriptions
Claire Bagnall
claire.bagnall@lbresearch.com

Senior business development managers
Adam Sargent
adam.sargent@gettingthedealthrough.com

Dan Brennan
dan.brennan@gettingthedealthrough.com

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Law Business Research Ltd
Meridian House, 34-35 Farringdon Street
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Argentina, Mining and Glacier Protection

Sergio D Arbeleche and Sebastián P Vedoya[1]

This chapter focuses on Argentina's National Glacier Law, this law's impact on mining operations, and subsequent developments in legislation.

Context

Argentina is a federal country.[2] Provinces hold all powers not expressly delegated to the federal government in the National Constitution (the Constitution),[3] are the original owners of the natural resources located within their respective territories, are in charge of applying the federal Mining Code and (iv) can enact their own local environmental legislation, respecting the basic environmental benchmarks set forth by the federal government, which in turn should never alter the powers held by the provinces (eg, the power to conduct environmental evaluations of activities to be conducted in the provincial territories).

Among the powers delegated by the provinces to the federal government, the following two are the most relevant here: the enactment of the federal Mining Code,[4] which is applicable in the whole Argentine territory, and the enactment of minimum environmental benchmarks legislation applicable nationwide to all activities, which all provinces must respect when enacting their local environmental regulations.[5]

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1 Sergio D Arbeleche and Sebastián P Vedoya are partners at Bruchou, Fernández Madero & Lombardi.

2 The Argentine provinces existed before the federal government. Provinces may enact their own environmental legislation that applies within their territories (known as local environmental legislation). The right to perform environmental evaluations and decide on environmental approvals on provincial territory belongs to the provincial governments.

3 http://servicios.infoleg.gob.ar/infolegInternet/anexos/0-4999/804/norma.htm.

4 http://servicios.infoleg.gob.ar/infolegInternet/anexos/40000-44999/43797/texact.htm.

5 These minimum environmental protection parameters or standards may be imposed at the federal level as a base, and the provinces may lay down local environmental rules above those requirements or further regulate them without impairing or reducing the standard thereof.

A series of regulations on minimum environmental standards was first approved by the National Congress (the Congress) after the most recent amendment to the Constitution, in 1994.

The first relevant environmental regulation of this kind was the inclusion in 1995 of an environmental chapter in the federal Mining Code, setting forth environmental obligations to be fulfilled by mining projects of all kinds.[6]

In 2002, Congress enacted the main minimum environmental standards legislation, Law No. 25,675,[7] (also known as the General Environmental Law), which is applicable nationwide to all activities, including mining.[8] Among other important topics, this Law sets forth a series of provisions that are challenging for the mining industry to adopt, such as mandatory public consultations and mandatory environmental insurance for certain activities exceeding a specific environmental risk level.

In the above-mentioned constitutional context, Congress approved a new minimum environmental standards regulation in October 2010, specifically regulating the minimum environmental protection standards for the preservation of glacial and periglacial zones (National Glacier Law, No. 26,639).[9] Until the enactment of this Law, protection of glacial and periglacial zones was subject to the General Environmental Law.

Some history preceding the National Glacier Law

The introduction of the National Glacier Law was preceded by a strong political discussion mainly driven by environmentalists, non-governmental organisations opposed to mining (anti-mining NGOs) and some politicians, with a serious lack of technical, legal and factual analysis. As part of this political discussion, a previous bill regulating the minimum environmental protection standards for the preservation of glacial and periglacial zones was approved by Congress but vetoed by the President in 2008.

The discussion on the need for a law protecting glaciers was triggered by a fictional situation fostered by environmentalists and anti-mining NGOs, supported by certain political sectors, arguing, among other things, that:

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6 Obligations imposed on mining activities by this new rule included the filing of an environmental impact report with the competent environmental authority for review and eventual approval, to be updated every two years or earlier if required owing to significant changes to the project or unexpected relevant events demanding a review of the environmental assessment. Accordingly, mining activities had to fulfil and abide by (i) environmental regulations specifically applicable to mining (included in the federal Mining Code), (ii) local environmental regulations enacted by provinces (within their non-delegated powers) and (iii) federal environmental regulations, including the minimum environmental standards regulations.

7 http://servicios.infoleg.gob.ar/infolegInternet/anexos/75000-79999/79980/norma.htm.

8 The Federal Environmental Council defined through Regulation 92/2004 that a 'minimum protection standard' is an environmental protection base threshold to be passed by the federal government, and enforceable in a uniform manner in the entire federal territory as an irrevocable standard ensuring minimum environmental protection to all inhabitants, and that any construction of a minimum environmental standard must be made restrictively, aiming to achieve the purpose of environmental protection without altering or affecting the powers reserved to the provinces.

9 http://servicios.infoleg.gob.ar/infolegInternet/anexos/170000-174999/174117/norma.htm.

- without a glacier protection law, glaciers remain unprotected;[10]
- the mining industry wanted to develop projects on and over covered and uncovered glaciers, which is irreconcilable with the protection thereof;[11]
- without a prohibitory law on glacier protection, mining activity would be automatically permitted;[12] and
- glaciers are melting owing to mining.[13]

On 22 October 2008, Congress approved the first bill on minimum requirements for the protection of glaciers and the periglacial environment, as a law setting up minimum environmental requirements or standards applicable nationwide in connection with them.[14]

This bill was vetoed by the President (Veto Decree No. 1837/2008)[15] on the following grounds:

- The establishment of minimum standards may not be limited to an absolute prohibition of activities but, on the contrary, will lay down minimum standards to be followed by the provinces, although the provinces may establish stricter standards according to their own environmental conditions.
- Even without a glacier protection law, before authorising any activity and the implementation of any investment, it is necessary to ascertain, at a provincial level, the feasibility and technical and environmental viability of such an investment. Thus, authorisation shall be granted only in respect of activities that imply or entail the possibility of being carried out within the framework of sustainable development with due care for the environment.
- The prohibition of the activities described in the bill, if it came into effect, may impair the economic development of the provinces involved, and hinder the performance of any kind of activity or work in the Andean areas.[16] The prohibition against mining, or oil exploration and exploitation activities, including those carried out in the periglacial environment saturated with ice, will cause environmental aspects to prevail over activities that may be authorised and conducted with due care for the environment.

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10 However, there are different protected areas in which mining is forbidden, such as national and provincial reserves of different natures. Of course, no mining activity is allowed or performed in these areas, and there is no discussion about it. Glaciers and other geological formations outside specifically protected areas are part of the environment and are therefore subject to the protection of general environmental legislation.

11 This is also untrue, since mining is not performed in such geological formations, many of which have specific legal protection beyond the National Glacier Law.

12 This is false, since the nonexistence of a prohibition does not mean or imply that activities are automatically allowed since, for the activity to exist, the same must be previously assessed and approved from an environmental standpoint.

13 There is no scientific argument to sustain this as a general rule. Glaciers are melting as a result of global warming, which is not attributable to mining.

14 The 2008 bill went through Congress without being analysed by the Mining Commissions of the House of Representatives or the Senate, or previously consulting with business chambers, industrial organisations or other representatives of activities that may be affected by this new regulation.

15 http://servicios.infoleg.gob.ar/infolegInternet/anexos/145000-149999/146980/norma.htm.

16 The prohibition against construction of infrastructure works fails to take into account that many of them are public works intended for use by the community, such as cross-border roads.

- In view of the fact that the General Environmental Law provides for an environmental impact assessment process before authorising any work or activity capable of degrading the environment, the prohibition contained in the bill proves excessive, and cannot validly form part of a minimum environmental standard.
- The bill, upon subjecting any activity in progress to a new environmental audit – the outcome of which may result in the relocation or discontinuance of the activity – fails to take into account that any activity currently in progress in the provinces involved has undergone and obtained the relevant environmental assessments and authorisations before being started, and is permanently monitored by the provincial environmental authorities.
- The activities prohibited under the bill and the undertaking of an environmental audit on activities in progress do not contemplate that the provinces involved, through their current institutions and national and local regulations, have in place enough control mechanisms to evaluate and authorise infrastructure, industrial, mining, hydrocarbon and other activities in full harmony and balance with due care for the environment.

Following an invitation by the President in the Veto Decree, several Argentine provinces issued their own glacier protection laws:[17]

- Santa Cruz: Law No. 3,123 (2009);[18]
- San Juan: Law No. 8,144 (2010);[19]
- Salta: Law No. 7,625 (2010);[20]
- La Rioja: Law No. 8,733 (2010); and
- Jujuy: Law No. 5,647 (2010).[21]

These provincial glacier laws established more stringent evaluation processes rather than prohibitions.

Two years after the 2008 bill was vetoed, the National Glacier Law was enacted. It is currently in force and is almost identical to the 2008 bill. Accordingly, all criticisms made in the Veto Decree (which evidenced the unconstitutionality of the 2008 bill) are completely applicable to the National Glacier Law.

17 A conflict between such laws and the National Glacier Law exists where the standard set by the provincial law is higher than that imposed by the National Glacier Law as a minimum environmental standard. As described when making reference to the reasons for the veto, this is a complex conflict, whereby on one hand the action of Congress is allowed by section 41 of the Constitution, and on the other hand the provinces have the right and are allowed to defend their respective jurisdictions as original owners of all powers not delegated to the federal government, as owners of the natural resources and as competent authorities to issue environmental permits, all of which are the limits of the exercise of powers granted by section 41 of the Constitution.

18 www.santacruz.gov.ar/ambiente/leyes_provinciales/ley%20N_3123%20de%20Glaciares.pdf.

19 https://farn.org.ar/wp-content/uploads/2015/10/Ley-8144-San-Juan.pdf.

20 www.boletinoficialsalta.gob.ar/VersionImprimibleLeyes.php?nro_ley2=7625.

21 www.legislaturajujuy.gov.ar/img/sesiones/ftp/s_701/66-P-10_LEY%205647_10.pdf.

The current regime

National Glacier Law

The National Glacier Law was approved by Congress in September 2010 and was enacted and published in the Official Gazette in October 2010. Its main features are:

- Minimum standards for the protection of glaciers and periglacial environments are established, with the aim of preserving them as:
  (1) strategic reserves of water resources for human consumption;
  (2) for agriculture and as water suppliers to recharge hydrographic basins;
  (3) for biodiversity protection;
  (4) as a source of scientific information; and
  (5) as a tourist attraction. Glaciers are public goods.
- 'Glacier' is defined as any mass of perennial ice resting on land or flowing slowly, with or without interstitial water, formed by the recrystallisation of snow, located in different ecosystems, regardless of its form, dimension and state of conservation. Rock debris and internal and superficial water courses are constituent parts of each glacier. Likewise, the 'periglacial environment' in high mountains is the area with frozen soils acting as a regulator of the water resource, and the 'periglacial environment' in mid and low mountains is the area acting as the regulator of water resources with soils saturated with ice.
- A National Inventory of Glaciers was created (the Inventory), in which all glaciers and periglacial geological formations (geoforms) acting as water resources in the national territory must be registered, with all the necessary information for their adequate protection, control and monitoring. Responsibility for the Inventory was allocated to the Argentine Institute of Nivology, Glaciology and Environmental Sciences (IANIGLA), coordinated by the national law enforcement authority, currently the Secretary of Environment and Sustainable Development (the Federal Secretary).
- Certain activities are prohibited on glaciers: those that may affect their natural conditions or any of the characteristics described above, and those involving their destruction or transport, or interfering with their progress. In particular, the following activities are Prohibited Activities:[22]
  - The release, dispersion or disposition of polluting substances or elements, chemical products or waste of any nature or volume. These restrictions are also applicable to those activities carried out in the periglacial environment.
  - The construction of architectural or infrastructure works, except for those necessary for scientific investigations and risk prevention.
  - Mining and hydrocarbon exploration and exploitation. These restrictions are also applicable to those activities carried out in the periglacial environment.
  - The installation of industries, or the development of industrial works or activities.

22 Where the prohibition would apply, glaciers and protected geoforms with relevant water functions are identifiable, in principle. The main problem is that the vague language of the National Glacier Law, and the anti-mining NGOs' aim against mining activity, tried to force the concept that the prohibition was applicable in all periglacial environments (a much broader concept than just the glacial geoforms with relevant water functions).

- IANIGLA was instructed to implement the Inventory immediately in those areas that are considered a priority owing to the existence of Prohibited Activities.
- All proposed activities on glaciers and periglacial environments that are not prohibited are subject to an environmental impact assessment and strategic environmental assessment process.[23]
- Activities subject to prohibition that were already in existence at the time of the enactment of the National Glacier Law must undergo a new environmental audit (environmental re-evaluation), irrespective of whether an environmental permit has already been obtained, to determine the effects on glaciers and periglacial environments. If it is verified that a glacier or periglacial environment is significantly affected, the authorities are instructed to establish the relevant measures required to comply with the Glaciers Protection Law, having the power to order the termination or relocation, or both, of activities, and all necessary clean-up, protection and restorative measures.[24]

In addition to the extensive prohibitions included under the National Glacier Law, one of the main criticisms was in respect of the geographical extent of the prohibition (only glacial geoforms with relevant water functions or all periglacial environments – the latter being a much broader concept). The arguments put forward by opponents of mining activities extended the scope of the prohibition (by using the periglacial environmental concept) to practically all the Argentine Andes; the mining industry focused on the interpretation that the protection should apply to glacial geoforms with water functions (ie, geoforms within the glacial and periglacial environments registered by IANIGLA, but not all periglacial environments).[25]

In the context of these discussions, IANIGLA completed the Inventory, which was implemented based on international scientific standards, and reviewed and approved by IANIGLA and the Federal Environmental Authority. IANIGLA adopted the standards whereby only those geoforms with relevant water functions should be included in the Inventory as protected geoforms rather than all periglacial environments, which do not necessarily have relevant water

23 This means that in addition to the prohibition of certain activities. The Prohibited Activities are excluded from the environmental impact assessment. The minimum environmental standards legislation does not only contain a mandate for provinces not to environmentally approve certain activities when their effects are verified, but rather exclude such activities from the possibility of filing an environmental impact report. This last feature generated an intense discussion between opponents of mining and the mining industry. The opponents argued that all Prohibited Activities (even mining activities in periglacial environments) are excluded from the possibility of an environmental impact assessment.

24 Based on this feature, NGOs that are opposed to mining intended to suspend all current projects until they have obtained a favourable environmental re-evaluation. However, the mining sector argued that the existing projects have already had an environmental assessment (which is and was a mandatory requirement under pre-existing environmental legislation) and that the effects on the environment, including glaciers, were already evaluated, and therefore the precautionary principle of suspending the activities under execution does not apply. Although this discussion reached the courts, so far no mining project has been suspended. Special environmental audits have been performed on some existing mining projects, resulting in the demonstration of the non-existence of any effects on geoforms protected under glaciers protection law.

25 Some provinces and companies have filed claims with the National Supreme Court with the argument that the National Glacier Law is unconstitutional.

functions. In line with international standards, for IANIGLA, only uncovered, covered and rock glaciers with a life exceeding two consecutive years and covering at least one hectare could potentially have relevant water functions.

For the purposes of the development of the Inventory, additional regulations were approved. National Executive Order No. 207/11[26] states that, among other purposes, the Inventory was 'to define the kind and level of detail necessary so that the glaciological and geocryological information obtained can enable the correct management of the strategic reserves of water resources'.[27]

Following this regulation, IANIGLA and the National Scientific and Technical Research Council prepared a document entitled 'National Inventory of Glaciers and Periglacial Environment: Reasons and Implementation Schedule'[28] (the Inventory's Reasons and Implementation Schedule), which contains the objectives, background, monitoring strategy, methods, estimated costs and completion time of the Inventory.

This document states:[29]

- The Inventory's main objective is the identification, characterisation and monitoring of all glaciers and cryoforms acting as strategic water reserves in the national territory.
- For the specific and operative purposes of the Inventory, IANIGLA proposed specific definitions and a minimum size of the bodies to be inventoried inside Argentina's glacial and periglacial environments.
- The term 'glacier' is defined as a permanent ice body originated on land, visible for at least a period of two years, with (or without) evidence of movement as a result of gravity (eg, cracks, ogives, medial moraines), and of a surface greater than or equal to 0.01km^2 (1 hectare – a minimum surface that is also applicable to rock glaciers, as defined).
- A strategic water reserve is a very scarce, strategic natural resource, which is currently and potentially vital for the development of human activity and for the maintenance of a nation's quality of life. When referring to water resources, in particular to solid-state water reserves, a 'strategic reserve' refers to the long-term capacity for regulation – that is to say, the water accumulation in prosperous years and its release in years of shortage.
- 'Perennial ice' is water in solid state, formed by compaction of snow. To be able to consider it perennial, the ice must stay in the same place for two or more years.

In 2014, IANIGLA prepared a 'Handbook for the Preparation of the National Inventory of Glaciers' (the Handbook), according to which, had the aim of providing a 'detailed methodological guide

26 http://servicios.infoleg.gob.ar/infolegInternet/anexos/175000-179999/179680/norma.htm.

27 Regarding National Executive Order No. 207/11, it was put on record that the National Glacier Law 'understands that a strategic natural resource is every scarce resource currently or potentially vital for the human activity development or for the maintenance of a nation's quality of life'. And that, in particular, solid-state water reserves 'are considered a "strategic reserve" due to their long-term capacity for regulation'.

28 www.glaciaresargentinos.gob.ar/wp-content/uploads/legales/fundamentos_cronograma_ejecucion.pdf.

29 Also, the 'National Inventory of Glaciers and Periglacial Environment: Reasons and Implementation Schedule' includes an explanation about the satellite images system used for the Inventory, with which the majority of similar inventories in Europe and around the world have been made.

for those technicians and professionals in charge of the preparation of the National Inventory of Glaciers'.

As the Handbook states, the geological formations that could have a water function in glacial and periglacial environments are uncovered glaciers,[30] snow patches or glacierets,[31] covered glaciers[32], and rock glaciers.[33] When detailing each of the inventoried geological formations, the Handbook adopted the minimum size of 0.01km^2 (1 hectare), as was proposed in the Inventory's Reasons and Implementation Schedule.[34]

The aforementioned standards were approved by the Federal Secretary through Executive Order No. 1141/2015,[35] which approved the 'administrative procedure for document and data management of the National Inventory of Glaciers'. This Executive Order established that IANIGLA shall make the Inventory and a 'single procedure for the technical validation of the National Inventory of Glaciers' pursuant to the methodology established in the Inventory's Reasons and Implementation Schedule, which states that the Federal Secretary does not validate IANIGLA's inventories as regards their specific technical content, since it has not been formally granted that power. Validation is the verification of compliance with the above-mentioned documents, for which the standards are approved by the enforcement authority.

This Executive Order further refers to the Handbook, stating that the minimum area of uncovered ice to be inventoried is 0.01km^2, and that it is necessary to verify that each inventory clarifies the standards adopted regarding this matter. The Executive Order constituted the approval of IANIGLA's standards by the Federal Secretary, and imposed on IANIGLA the responsibility of respecting those standards.

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30 Uncovered glacier: a permanent ice body originated on land by the compaction and recrystallisation of snow, ice, or both, without significant rock debris, visible for at least a period of two years with evidence of movement caused by gravity (cracks, ogives, medial moraines) and of a surface greater than or equal to 0.01km^2 (1 hectare).

31 Snow patches or glacierets: permanent ice or snow bodies originated on land by the compaction and recrystallisation of snow, ice, or both, without significant rock debris, visible for at least a period of two years, but which do not show evidence of movement owing to gravity. Permanent snow patches or glacierets are solid-state water reserves and have therefore been included in the inventory.

32 Covered glacier: a permanent ice body originated on land by the compaction and recrystallisation of snow, ice, or both, with significant rock debris, visible for at least a period of two years with evidence of movement caused by gravity (eg, cracks, ogives, medial moraines) and of a surface greater than or equal to 0.01km^2 (1 hectare).

33 Rock glacier: a mass of frozen rock fragments and ice, with evidence of movement by the influence of gravity and deformation of the mountain permafrost, the origin of which is related to the cryogenic processes associated with permanently frozen soils and underground ice, or with the ice coming from covered and uncovered glaciers, and of a surface greater than or equal to 0.01km^2 (1 hectare). Rock glaciers greatly depend on the existence of rock debris, snow and ice.

34 Likewise, as regards uncovered ice, the Handbook expressly highlights that 'the minimum area to be inventoried for covered and uncovered ice and rock glaciers is a surface greater than or equal to 0.01km^2 (1 hectare)'.

35 http://servicios.infoleg.gob.ar/infolegInternet/anexos/255000-259999/258825/norma.htm.

A full copy of additional regulations relating to the National Glacier Law[36] and the Inventory[37] are available on the official National Glacier Inventory web page (www.glaciaresargentinos.gob.ar).

The 0.01km^2 benchmark adopted by IANIGLA as a minimum size for including ice bodies in the Inventory is in line with the general guidelines of the World Glacier Monitoring Service (WGMS)[38] and the International Permafrost Association.[39] The standards used by IANIGLA for the development of the Inventory are consistent with those used internationally for similar works and have solid scientific grounds.[40]

The 'Recommendations for the compilation of glacier inventory data from digital sources' (the Recommendations)[41] – prepared by different authors who are members of the WGMS and the National Snow and Ice Data Center in the United States (NSIDC)[42] and published in 2009 by the International Glaciological Society in the Annals of Glaciology[43] – offer an explanation as to why the WGMS decided to adopt one hectare as a minimum to register glaciers.[44]

In other jurisdictions, inventories have been made using similar or less strict benchmarks:

- Alaska: 0.025km^2 (2.5 hectares) and 0.02km^2 (2 hectares);
- Canada: 0.05km^2 (5 hectares);
- Norte Chico, Chile: 0.01km^2 (1 hectare);
- France: 0.01km^2 (1 hectare);
- Norway: 0.01km^2 (1 hectare);

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36 After the issuance of Executive Order No. 1141/2515, numerous additional regulations were issued by the national environmental authority, by which IANIGLA's inventory of each basin and sub-basin in the country was published, the inventory's disclosure was authorised and expressly recognised in their whereas clauses that the procedures established for the inventory's preparation had been complied with, pursuant to Regulation No. 1141/2015. These regulations can be found at www.glaciaresargentinos.gob.ar/?page_id=521.

37 www.glaciaresargentinos.gob.ar/?page_id=193.

38 https://wgms.ch/.

39 https://ipa.arcticportal.org/.

40 The Handbook also states that the document 'is based on . . . guidelines and methodologies previously used by IANIGLA and international groups specialising in glacier inventories (World Glacier Monitoring Service, WGMS, and the project Global Land Ice Measurements from Space, GLIMS)'.

41 www.glims.org/glacierdata/data/lit_ref_files/paul2009.pdf.

42 https://nsidc.org/.

43 www.cambridge.org/core/journals/annals-of-glaciology/article/recommendations--for-the-compilation-of-glacier-inventory-data-from-digital-sources/6BAE48BE4B8FEEEEBCFB59A2684A2427.

44 The minimum size of glaciers was not defined consistently in relation to the existing inventories. For example, the inventory of glaciers in Svalbard, Norway, only registered ice bodies exceeding 1km^2 (WGMS 1989). In the Alps, with a different distribution of dimensions, 90 per cent of the glaciers would have been excluded according to this rule. However, a size of 0.01km^2 could be seen as a practical minimum limit since there can be a great number of geological formations inferior to it and their status as glaciers is doubtful. This is also the minimum size that can be identified with certainty in good conditions from the satellite sensor operating between 15 and 30 metres of spatial resolution (eg, Terra ASTER, SPOT HRV, Landsat TM/ETM+). This is why the use of 0.01km^2 is recommended as the minimum size to be registered when permitted by the conditions. This small size is also important to follow temporary developments. The geological formations that were much bigger in a previous inventory could have decreased to this size, or several snow patches of this size. In this case, the total size of the remaining ice bodies could again be greater than 0.01km^2.

- Peru: 0.01km^2 (1 hectare); and
- Switzerland: 0.1km^2 (10 hectares).

Based on the foregoing, it is reasonable to argue that the 0.01km^2 benchmark used by IANIGLA is within international scientific standards. It even has a similar or greater degree of detail than some of the inventories prepared in countries with a long tradition of glacier studies, and that have already completed several national inventories, such as Switzerland and Canada. It is therefore evident that, of the international requirements commonly used, IANIGLA adopted the most inclusive and demanding.[45]

The current situation

It is very clear that the aim of the National Glacier Law, for some of the groups that have adopted it, is to prohibit mining rather than protect geological formations with a water function. After the introduction of the National Glacier Law, environmentalists and anti-mining NGOs made efforts to suspend the operation of existing mining projects and prevent the development of new projects. At the initiative of anti-mining NGOs (whose purpose was to prohibit mining in the whole periglacial environment), criminal action was started against former officers of the federal government who were in charge of developing the Inventory (including the former head of IANIGLA, Dr Ricardo Villalba),[46] on the basis of an accusation that they failed to fulfil their duties and alleging that by further regulating the National Glacier Law, and the Inventory (which adopted the 0.01km^2 benchmark defined by IANIGLA), the scope of protection was reduced.[47] Dr Villalba is currently under indictment for this accusation.

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45 If the minimum size was less than 1 hectare, there would be a lack of water function (a size of 0.01km^2 could be seen as a practical minimum limit since there can be a great number of geological formations inferior to it and their condition as glaciers is doubtful). It is the minimum unit allowing for the localisation of geological formations through satellite technology internationally accepted for the preparation of a glacier inventory. This is why the use of 0.01km^2 is recommended as the minimum size to be registered when permitted by the conditions.

46 According to the scientific community (see 'Letter of Support for Dr Ricardo Villalba in his capacity as former Director of the Argentine Institute of Snow and Glaciers (IANIGLA) and of the National Glacier Inventory of Argentina'): 'Dr Villalba is among the top climate scientists in Argentina. He is a Senior Research Scientist of CONICET (National Research Council of Argentina) at the Argentine Institute of Snow and Glaciers (IANIGLA) in Mendoza. He holds the following academic degrees: BS in Forest Engineering (Universidad Nacional de La Plata, Argentina); MS in Photo Interpretation in Forestry (CIAF, Colombia); and PhD in Geography (University of Colorado, USA). Dr Villalba was also a Postdoctoral Research Fellow at Lamont-Doherty Earth Observatory (Columbia University, USA). This breadth of academic training is impressive by any standard.'

47 Although the publication of the Inventory brought some clarity regarding the scope of the protection established by the National Glacier Law, there is still a great deal of uncertainty for the development of projects (mining and other infrastructure projects located in glacial and periglacial environments) as a consequence of the criminal actions started by environmentalist and anti-mining NGOs against the officers responsible for regulation of the National Glacier Law and for compiling the Inventory (but without formally challenging the regulations or the content of the Inventory), some of whom are currently indicted as a consequence of questionable decisions of the federal courts, mainly driven by political reasons and without making any serious scientific analysis of the subject matter.

The scientific community has been very clear in rejecting the indictment, which has had international repercussions. According to an interview (published online)[48] with Mr Bruce Raup, a glaciologist at the NSIDC in Boulder, Colorado, the persecution of IANIGLA's scientists 'is surreal and kind of ridiculous', since many scientists set a minimum glacier size of one hectare to reduce the risk of incorrectly counting ephemeral snow and ice. In fact, other countries even exclude any geoforms that do not have an area of at least five, 10 or even 12 hectares from glacier inventories, making the Argentine benchmark used by IANIGLA one of the most inclusive.

More than 130 scientists at different institutions worldwide published a 'Letter of Support for Dr Ricardo Villalba in his capacity as former Director of the Argentine Institute of Snow and Glaciers (IANIGLA) and of the National Glacier Inventory of Argentina'.[49]

Unfortunately, the criminal case is continuing. Hearings related to the case that were scheduled to be held in 2020, were suspended due to the covid-19 pandemic, and it is currently uncertain when are they will be held.

Several mining companies have challenged the constitutionality of the National Glacier Law. In 2019, the National Supreme Court ruled in some of those cases. Despite media reports that the Supreme Court had declared the constitutionality of the National Glacier Law, in fact the Court considered there was not a concrete case nor damage that allowed it to rule on the Law's constitutionality. Without making a decision in this regard, the Court provided some guidelines for interpreting and understanding the scope of protection of the National Glacier Law and the steps to be taken to address the matter.

In this regard, the Supreme Court established that there was no evidence of concrete or imminent damage to claimants resulting from the National Glacier Law, which in our view means that such mining projects, in turn, do not violate the Law simply by being developed in a periglacial environment. Thus, the Law does not impose an absolute prohibition, nor exclude mining projects located in periglacial areas from a proper environmental evaluation. The ruling also made clear that the National Glacier Law is intended to protect geoforms with relevant water functions and that these are the geoforms registered on the National Glacier Inventory. This has indirectly upheld the standards implemented by IANIGLA for the Inventory, and has ruled out an automatic prohibition with no access to an environmental evaluation that anti-mining NGOs pursued for mining projects located in a periglacial environment, by forcing an unreasonable interpretation of the National Glacier Law. In addition to the existence of a matter in dispute, it was held that courts shall weight individual rights that form part of the constitutional property right and reconcile them with collective incidence rights (in this case, rights protected under the National Glacier Law) to ensure that the development of a lawful industry be sustainable to achieve common welfare purposes.

Furthermore, the Supreme Court held that the provinces and the federal government need to work together to effectively coordinate all federal and provincial efforts to comply with the environmental rule under Argentina's Constitution. In our view, the ruling leaves the door open for rules to be passed and for the government to apply different interpretations on the scope of protection under the National Glacier Law to harmonise all the rights and interests at stake

48 www.nature.com/articles/d41586-017-08236-y.

49 www.conicet.gov.ar/wp-content/uploads/Letter_Villalba.pdf.

(individual rights and collective rights), based on which it could be assumed that no prohibition under the National Glacier Law is of an absolute nature.

The Supreme Court particularly emphasises the right of the community to strategic water resources and the protection thereof under the National Glacier Law, and, in its opinion, under the Law, the legislator connects the effects and the incidence of large-scale mining on the preservation and protection of glaciers as strategic water supply resources. The foregoing could be used to rule out the enforcement of prohibitions under the National Glacier Law, provided that geological formations do not constitute relevant water resources, which circumstance necessarily involves government action, whether by further developing the National Glacier Law or by scientifically determining whether or not a particular geological formation constitutes a strategic water reserve, an aspect that could be assessed at provincial level and as part of the environmental assessment process for mining projects at any stage.

Conclusion

Although the discussion regarding the scope and meaning of the National Glacier Law is not over, the aforementioned ruling of the National Supreme Court made it clear that the Law does not impose absolute prohibitions on the development of mining in glacial or periglacial areas, nor does it exclude mining projects in a periglacial environment from environmental evaluation, and that the definition of the scope of the prohibitions included in the Law should be the outcome of the coordinated technical and hermeneutical work that the provinces and federal government need to carry out to comply with the environmental rule under Argentina's Constitution, harmonising all rights and interests at stake. An important step was taken by the National Supreme Court towards the clarification of the scope and meaning of the National Glacier Law with regard to mining activity and its future development.

The national and provincial authorities should complete the task and provide the mining industry with additional clarity and legal certainty regarding this matter. Presidential elections, the change of administration that occurred at the end of 2019, the covid-19 pandemic and the 2021 mid-term elections continue to delay the design and implementation of several policies, among which this particular issue can be included. The activity of anti-mining NGOs, and that part of the judiciary that supports their political agenda, is still a real source of concern for those making decisions about mining investments and environmental permits, and therefore action by the government in this matter is still needed. However, the context following the aforementioned ruling is different and more favourable, and a strategic legal approach can be implemented to strengthen the permission process. In line with the above, the current trend is that the provincial competent authorities are not excluding nor limiting access to any mining project from environmental evaluation process with protected geoforms in their area of interest.

The Federal Mining Authority continues to develop an initiative for the construction of a shared view of mining in Argentina, which progress has been also impacted by the covid-19 pandemic and political reasons. The uncertainty brought to the mining industry by the National Glacier Law is included as a topic to be addressed in connection with water usage in the context of the relationship between the mining industry and environmental sustainability. Hopefully, this initiative may conclude with the enactment of a supplementary law or regulatory executive orders at the national or provincial level (or both) to bring about greater certainty. Implementation of a definitive solution is still uncertain, but there is no doubt that the aforementioned developments are an important step towards a reasonable interpretation of the National Glacier Law.

Appendix 1

About the Authors

Sergio D Arbeleche

Bruchou, Fernández Madero & Lombardi

Sergio D Arbeleche graduated from the School of Law at the Pontifical Catholic University of Argentina in 1998. He obtained a pre-master of corporate law at Austral University in 1997, completed a postgraduate specialisation course in oil and gas at the University of Buenos Aires (2011), and studied an international LLM programme on US law and international business law, graduating cum laude, at Suffolk University (2013).

Since the end of 2014, Mr Arbeleche and his colleague Sebastián P Vedoya have been in charge of the mining and environmental areas of practice at the law firm.

Since 1998, Mr Arbeleche has been a key member of the natural resources and environmental departments at top-tier prestigious law firms specialising in those areas of practice. In 2002, he was retained as legal adviser under the United Nations Development Programme,for mining development purposes of the federal mining authority.

In 2013, he worked as coordinator of the Legal Affairs Committee of the Argentine Chamber of Mining Entrepreneurs, and is currently coordinator of the Glaciers Committee there. He has earned remarkable references in *The Legal 500* and *Chambers & Partners*.

He has been a university professor of natural resources and environment at the University of Argentine Social Museum for almost eight years. Since 2013, he has been head lecturer of the Master of Mining Business Management programme at the Catholic University of Cuyo.

Sebastián P Vedoya

Bruchou, Fernández Madero & Lombardi

Sebastián P Vedoya graduated from the School of Law at the Pontifical Catholic University of Argentina in 1996. He was admitted to the local Bar in 1997, and took a programme on US business law at the University of California in 2000.

Before becoming a partner at Bruchou, he was a member for more than 16 years of the natural resources and environmental departments of top-tier prestigious law firms specialising in those areas of practice (as a partner in those law firms between 2008 and 2014).

Since the end of 2014, Mr Vedoya and his colleague Sergio D Arbeleche have been in charge of the mining and environmental areas of practice at Bruchou.

He has been a university professor of natural resources and environment at the University of Argentine Social Museum for almost seven years, and a postgraduate professor at the Pontifical Catholic University of Argentina. He is a lecturer on the Master of Mining Business Management programme at the Catholic University of Cuyo.

Mr Vedoya was ranked among the Best Lawyers of Argentina by *Revista Apertura* (a magazine in Argentina recognised for its legal rankings). He is currently coordinator of the Glaciers Committee at the Argentine Chamber of Mining Entrepreneurs. He has also earned remarkable references in *The Legal 500*, *Chambers and Partners*, and *Who's Who Legal*.

Bruchou, Fernández Madero & Lombardi
Ing Enrique Butty 275, 12th Floor
C1001AFA Buenos Aires
Argentina
Tel: +54 11 4021 2300
Fax: +54 11 4021 2301
sebastian.vedoya@bruchou.com
sergio.arbeleche@bruchou.com
www.bruchou.com

an LBR business