

ARTICLE

FINDING A PLACE FOR GLACIERS WITHIN ENVIRONMENTAL LAW: AN ANALYSIS OF AMBIGUOUS LEGISLATION AND IMPRACTICAL COMMON LAW

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INTRODUCTION

Alberta is home to over 700 glaciers.¹ These glaciers, all found in the Rocky Mountains, are originating sources to five of Alberta's seven major river basins, including all of the rivers that run through Calgary, Edmonton, Red Deer, Medicine Hat, and Fort McMurray.² Many of these glaciers are also located within national and provincial parks and attract tens of thousands of visitors per year.³ It is surprising to discover, then, that there is no legislation, either at the provincial or federal level, that explicitly regulates or protects Alberta's glaciers.

The aim of this article is three-fold. First, it explores why glaciers are of *sui generis* character and should be afforded a specific legal status unto themselves. It argues that the unique circumstances of glaciers mean that they cannot be fully contemplated under other legislation. Second, it examines the provincial, federal, and international laws that could provide guidance to the legal status of glaciers in Alberta. It concludes that neither Albertan nor Canadian law are sufficient to cover the *sui generis* nature of glaciers, and that the relevant international law has no application in Alberta. Third, it uses case studies from other jurisdictions to suggest a legal regime for Alberta's glaciers. This article concludes that, like Argentina, Chile, and Kyrgyzstan, Alberta and Canada should draft legislation on the specific matter of glaciers. Although other jurisdictions, such as British Columbia, have incorporated glaciers in their current legislation, this article argues that their approach cannot capture all of the realities of glaciers, including their role as "water towers," their intrinsic value as a public good, and their marketable value as a tourist attraction.

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1 Alberta Water Portal, "Learn: Area and Number of Glaciers in Alberta", *Alberta Water Portal*, online: <<http://albertawater.com/glaciers/inventory-of-glaciers-in-the-canadian-rockies/area-and-number-of-glaciers-in-alberta>> archived at <<https://perma.cc/RH7X-EJZ3>> [AWP: Number of Glaciers].

2 *Ibid.*

3 John J Clague, Brian Menounos & Roger Wheate, "Canadian Rockies and Coast Mountains of Canada" in Vijay P Singh, Pratap Singh & Umesh K Haritashya, eds, *Encyclopedia of Snow, Ice and Glaciers* (London: Consultant Goldhawk Information, 2012) at 108.

I. WHY HAVE A LEGAL REGIME FOR GLACIERS?

A. Alberta's Glaciers

Glaciers can be loosely defined as solid masses of snow, ice, and water that collect precipitation in the winter, but do not disappear in the summer. In Alberta, there are an estimated 741 glaciers that cover a surface area of 791.4 square kilometres.⁴ Fourteen of these glaciers are between 10 and 40 square kilometers, and 378 of them are between 0.1 and 0.5 square kilometres.⁵ These numbers, however, are always subject to change as glaciers around the world, including in Alberta, are constantly retreating, fragmenting, and re-forming. As such, it is impossible to ever say exactly how many glaciers exist, how much they contribute to the freshwater system, or how long it will be until they disappear completely. Due to the fluid lives of glaciers, this article assumes that glaciers are located in national parks, provincial parks, and in unprotected areas.⁶

While glaciers serve multiple purposes, this paper focuses on three major services they provide to the human population. First, they serve as “water towers”⁷ that store the vast majority of the world’s fresh water.⁸ Second, they hold intrinsic value in their contribution to the environment and to scientific study.⁹ Third, they hold economic value in terms of touristic and scientific development.¹⁰ While there are different types of glaciers, this article focuses exclusively on the type in Alberta: alpine glaciers.

B. Threats to Glaciers

The greatest threat to Alberta’s glaciers is, without a doubt, climate change. Climate change has resulted in an alarming rate of glacial melt around the world and Alberta’s glaciers are no exception.¹¹ Between 1985 and 2005, Alberta lost 25 percent of its glaciated area. The Athabasca Glacier, one of Alberta’s largest glaciers, retreats by 5 metres every year.¹²

4 AWP: Number of Glaciers, *supra* note 1.

5 *Ibid.*

6 This is supported by the limited maps available. The only map that the author could locate was in C Simon L Ommanney, “Glaciers of North America-Glaciers of Canada: Glaciers of the Canadian Rockies” in Richard S Williams Jr & Jane G Ferrigno, eds, *Satellite Image Atlas of Glaciers of the World: US Geological Survey Professional Paper 1386-J-1* (Denver: USGS Information Services) at J204 [Ommanney].

7 Jakub Kronenberg, “Linking Ecological Economics and Political Ecology to Study Mining, Glaciers and Global Warming” (2013) 23 *Environ Policy Governance* 75 at 78 [Kronenberg]; Martin Beniston, Markus Stoffel & Margot Hill, “Impacts of Climate Change on Water and Natural Hazards in the Alps: Can Current Water Governance Cope with Future Challenges? Examples from the European ‘ACQWA’ Project” (2011) 14 *Environ Sci Policy* 734 at 734; Michael Butler, “Glaciers- Objects of Law and International Treaties” (2007) 3 *Alpine Space-Man & Environment* 19 at 27 [Butler].

8 AWP: Number of Glaciers, *supra* note 1; S Solomon et al, *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007* (Cambridge: Cambridge University Press, 2007) at 341.

9 Kronenberg, *supra* note 7 at 78.

10 *Ibid.*

11 Alexander Gillespie, *Climate Change, Ozone Depletion and Air Pollution: Legal Commentaries with Policy and Science Considerations*, (Leiden, the Netherlands: Martinus Nijhoff Publishers, 2006) at 117-8; Alberta Water Portal, “Learn: Climate Change Model Scenarios and Glacier Projections” *Alberta Water Portal*, online: <<http://albertawater.com/glaciers/climate-model-scenarios-and-glacier-projections>> archived at <<https://perma.cc/HE6Q-M3UG>>.

12 Alberta Water Portal, “Learn: Inventory of Glaciers in the Canadian Rockies” *Alberta Water Portal*, online: <<http://albertawater.com/glaciers/inventory-of-glaciers-in-the-canadian-rockies>>; The Canadian Press, “Athabasca Glacier could disappear within a generation, says manager,” *CBC News* (25 May 2014), online: <<http://www.cbc.ca/news/canada/calgary/athabasca-glacier-could-disappear-within-generation-says-manager-1.2653641>> archived at <<https://perma.cc/K3YJ-L58Z>>.

As the glaciers melt, their ability to be “water towers” also diminishes. By 2100, scientists predict that up to 90 percent of the Rocky Mountains’ current glaciers will have disappeared.¹³ When these glaciers disappear, so too will a substantial amount of Alberta’s water supply.

Glacial melting not only threatens freshwater supply, but it also raises the possibility of Glacial Outburst Floods (“GLOFs”).¹⁴ Although GLOFs have not yet been an issue in Alberta, they have caused wide-scale flooding in the Himalayas.¹⁵ As climate change causes glaciers to continually melt, GLOFs could become a problem for Alberta.

Climate change is not the only threat to glaciers; development (both for mining and for tourism) also poses a large risk. Mining development in Asia and South America¹⁶ has damaged glaciers where high alpine mining has resulted in glacial removal and degradation. Moreover, mining development that is simply *near* glaciers has been shown to lead to quicker melting and decreased water quality.¹⁷ Although mining has not yet been a threat to Alberta’s glaciers, it could be in the future. Touristic development, on the other hand, has already become an issue for Alberta’s glaciers, and some environmental groups have advocated for greater protection for these glaciers in order to prevent further development.¹⁸

C. Glaciers and Droughts in Alberta

Alberta’s glaciers hold an estimated 47 cubic kilometres of freshwater.¹⁹ That means that the water in Alberta’s glaciers could support Canada’s entire domestic water use for 11 years.²⁰ Alberta’s glaciers are a major source of freshwater for Alberta, particularly in years of drought.²¹ Five of Alberta’s seven major river systems originate in Alberta’s glaciers and they deliver water to Calgary, Edmonton, Red Deer, Medicine Hat, and Fort McMurray.²² Many of these rivers, including the Bow and Red Deer rivers, go through Palliser’s Triangle, a notoriously dry region of Alberta, Saskatchewan, and Manitoba.²³

13 “Western Canada to lose 70 percent of glaciers by 2100,” UBC News (6 April 2015), online: <<http://news.ubc.ca/2015/04/06/western-canada-to-lose-70-per-cent-of-glaciers-by-2100/>> archived at <<https://perma.cc/8GQU-CLQZ>>.

14 Roda Verheyen, *Climate Change Damage and International Law: Prevention Duties and State Responsibility* (Leiden, the Netherlands: Martinus Nijhoff Publishers, 2005) at 280-281 [Verheyen].

15 *Ibid* at 180-3. For instance, there were major GLOFs in Nepal in 1985 and in Bhutan in 1994. Over 200 glacial lakes currently pose a threat to communities in the Himalayas. See generally Jack D Ives, Rajendra B Shrestha & Pradeep K Mool, *Formation of Glacial Lakes in the Hindu Kush-Himalayas and GLOF Risk Assessment* (Kathmandu: International Centre for Integrated Mountain Development, 2010).

16 Kronenberg, *supra* note 7 at 75-76.

17 *Ibid* at 81.

18 Canadian Parks and Wilderness Society, *Special CPAWS Report: Commercial Development Threatens Canada’s National Parks* (Ottawa: Canadian Parks and Wilderness Society, 2015) [CPAWS Report].

19 Alberta Water Portal, “Learn: Glacier Volumes in Alberta”, *Alberta Water Portal*, online: <<http://albertawater.com/glaciers/inventory-of-glaciers-in-the-canadian-rockies/glacier-volumes-in-alberta>> archived at <<https://perma.cc/84MN-AD6X>> [AWP: Glacier Volumes].

20 Based on a calculation of the average person consuming 329 litres per day and the current population of 35.54 million people. “Wise Water Use,” *Environment Canada*, online: <<https://www.ec.gc.ca/eau-water/default.asp?lang=en&n=00EEE0E6-1>> archived at <<https://perma.cc/4BET-D7TV>>; “Population by year, province and territory”, *Statistics Canada*, online: <<http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm>> archived at <<https://perma.cc/H32U-H9X8>>.

21 Government of Alberta, *Facts about Water in Alberta* (Edmonton: Alberta Environment Information Centre, 2010) at 6 [Alberta: Water Facts].

22 AWP: Number of Glaciers, *supra* note 1; AWP: Glacier Volumes, *supra* note 19.

23 AWP: Glacier Volumes, *supra* note 19.

As climate change causes more glaciers to melt, this region will become substantially drier,²⁴ and issues over priority access to the remaining water supply will arise.

D. Glaciers and Legal Status

In early 2015, the National Aeronautics and Space Administration predicted that western North America, particularly the United States, would face a “mega-drought.”²⁵ If this occurs, and if Palliser’s Triangle is affected by it, then conflicts over water, whether regional or international, will follow. To imagine that glacial water would be outside this conflict is naïve. As more droughts are expected, and as Alberta’s population continues to grow, several important questions need to be answered.

As glaciers retreat and their incredible water storage is used up, who gets priority to the water? What happens to the riparian rights downstream when the primary source disappears? Who can tourist companies and national parks sue when one of their main attractions disappear? What if precious minerals, such as gold or copper, are discovered underneath Alberta’s glaciers? Who has rights to glaciers? Is there a right to glaciers? Can glaciers be removed and sold? If so, who gets the profits?²⁶ What happens to borders, provincial or international, when the glaciers that differentiate them melt?²⁷ Who will be liable in the case of a GLOF?

As argued below, Canada’s laws do not contemplate the role of glaciers and currently cannot provide answers to many of these questions. Canada and Alberta need a legal regime to tackle these issues in order to prepare for the effects of droughts and climate change.

E. Glaciers as *sui generis*

The above questions cannot be answered merely by mapping glaciers onto the current legal regime of environmental and water rights. To do so would be to ignore the unique realities of glaciers, both in terms of their geographical specificities and their threefold importance to the public: intrinsic value, marketable value, and as a source of water.

Instead, this article argues that glaciers are of a *sui generis* nature and require their own body of law. Glaciers support intricate eco-systems that regulate stream flow, provide a historical story of the earth that is literally frozen in time, and contribute to the stable regulation of the environment.²⁸ There are no other geographical features in the world that share these same attributes. Simply mapping glaciers onto the current environmental or water law regime would fail to capture their complex role. This reality has become

24 For an in-depth examination of the role of glaciers in Saskatchewan, see Laura Elizabeth Lamplugh Comeau, *Glacier Contribution to the North and South Saskatchewan Rivers* (MSc Thesis, University of Saskatchewan, Department of Geography, 2008) [unpublished].

25 Benjamin I Cook, Toby R Ault & Jason E Smerdon, “Unprecedented 21st Century Drought Risk in the American Southwest and Central Plains” (12 February 2015) *Science Advances*, online: <<http://advances.sciencemag.org/content/1/1/e1400082>> archived at <<https://perma.cc/5KUD-MAZR>>.

26 “Greenland to Sell Bottled Water from Melting Glaciers”, *Time*, online: <http://content.time.com/time/video/player/0,32068,52260545001_1947480,00.html>; Kristen French, “Mining a Norwegian Glacier for Luxury Ice Cubes”, (26 February 2015), *Glacier Hub* (blog), online: <<http://glacierhub.org/2015/02/26/mining-a-norwegian-glacier-for-luxury-ice-cubes/>> archived at <<https://perma.cc/KG9X-J3LF>>; “Svaice: The World’s Most Wanted Icecube”, *Svaice*, online: <<http://www.svaice.com/>>.

27 In 2007 a dispute arose between Italy and Switzerland over the retreat of a border-defining glacier. Although the dispute was amicable and quickly resolved, it demonstrated the potential for glacier-caused disputes.

28 Kronenberg, *supra* note 7 at 78. See generally Johannes Oerlemans, *Glaciers and Climate Change* (Lisse, the Netherlands: A A Balkema Publishers, 2001).

more obvious over time, and water scholars around the world have also called for the recognition of the *sui generis* nature of glaciers.²⁹ Moreover, there is precedence for recognizing different sources of freshwater as being *sui generis*.

Groundwater, for example, is a unique form of water storage that has been afforded its own body of law. The courts recognized groundwater's *sui generis* nature and thus came up with a specific common law system related to it.³⁰ The Alberta government also recognized this and explicitly added groundwater to its regulatory scheme within the *Water Act*.³¹ Even though the definition of "water" in the *Water Act* includes "all water on or under the surface of the ground,"³² "groundwater" still has its own definition.³³

Icebergs are another example. Icebergs are large chunks of ice which have calved from Arctic or Antarctic glaciers and float in international and national waters until they melt. While there is little clarity on exactly what law applies to icebergs, there is consensus on the fact that icebergs do not fit within the current system of public international law.³⁴ Although there is currently no answer, it is evident that however the law settles, it will have to pull from the unique realities of icebergs, rather than from the law that already exists.³⁵

With these examples in mind, the geographically unique features of glaciers bring rise to the necessity of recognizing them as a *sui generis* area of law in need of specific protection. The next section of this article explores whether the provincial, national, or international laws of Alberta are up to the task.

II. PROVINCIAL, FEDERAL, AND INTERNATIONAL LAWS ON GLACIERS

After establishing that glaciers are of *sui generis* nature, the question then turns to whether and how they are protected within the Canadian legal system. This section will examine the effect of provincial and national laws on glaciers as well as the applicability of the current common law water regime to glaciers. Three types of laws are examined herein: the provincial water regulation, provincial and federal parks statutes, and provincial and federal climate change statutes and regulations.³⁶ Overall, the author concludes that glaciers are outside the scope of all of these statutes and common law.

29 Laurence Boisson de Chazournes, *Fresh Water in International Law* (Oxford: Oxford University Press, 2013) at 44-46 [De Chazournes]; Jorge Daniel Taillant, "The Human Right . . . to Glaciers?" (2013) 28 *J Environ Law Litig* 60 at 62 [Taillant].

30 For a full examination of this, see Gerard V La Forest et al, *Water Law in Canada: The Atlantic Provinces* (Ottawa: Information Canada, 1973) [La Forest].

31 *Water Act*, RSA 2000, c W-3, s 1(v).

32 *Ibid*, s 1(fff).

33 *Ibid*, s 1(v).

34 Various approaches to icebergs have been proposed and rejected, such as recognizing them as *res nullius*, as shipwrecks, or of the common heritage of humankind. De Chazournes, *supra* note 29 at 39-44; Christopher C Joyner, "Ice-Covered Regions in International Law" (1991) 31 *Nat Resour J* 213 at 231-232.

35 *Ibid* at 42-44.

36 While it is possible that other statutes may have an effect on glaciers, or may be used to prosecute those who harm glaciers, these statutes were chosen for their more direct applicability. For instance, the *Water Act* was chosen because in British Columbia, glaciers are included in the water regulation statute. The provincial and national parks statutes were chosen because many of Alberta's glaciers are located within these parks. The climate change legislation was chosen because glaciers are strongly affected by climate change.

A. Statutory Law

The word “glacier” appears once in the entirety of Alberta’s legislation,³⁷ in reference to Glacier Power Ltd within the *Dunvegan Hydro Development Act*.³⁸ The word “glacial,” on the other hand, appears in three different regulations all referring to glacial fluvial deposits and glacial fill, and not to the glaciers themselves.³⁹ This means that there are no explicit laws in Alberta that clarify the law on glaciers. The question then turns to whether there are other laws in Alberta that might implicitly regulate or protect glaciers.

i. The *Water Act*

Glaciers could theoretically be within the scope of the Alberta *Water Act*.⁴⁰ Specifically, section 1(fff) of the *Water Act*, the definition of “water,” could be interpreted to include glaciers.⁴¹ This section defines “water” as meaning “all of the water on or under the surface of the ground, whether in liquid *or solid state*.”⁴² In simple terms, glaciers are solid forms of water. Thus, if this provision is interpreted broadly and literally, glaciers could be subject to the *Water Act*.

However, this is an unlikely interpretation of the *Water Act* for several reasons. First of all, it would require an overly broad interpretation of the word “solid.” Water, in its solid form, can be both snow and ice, and glaciers are in fact a mix of snow, ice, and water. Given that the province owns all of the beds underneath waterbodies,⁴³ this broad interpretation of the word “solid” would mean that the province would own not only all of the water underneath the glaciers, but also under any part of Alberta that is covered in snow. Effectively, then, the Alberta government would own all of Alberta, but only during the winter months. Thus an interpretation of section 1(fff) that includes snow would lead to an absurdity that cannot hold water.

Second, even if this absurdity could be overcome, it is still unlikely that the definition of “water” would include glaciers due to the principle of *noscitur a sociis*. The principle of *noscitur a sociis* states that where a term in a provision is ambiguous, it should be interpreted in light of the rest of the statute.⁴⁴ As the rest of the *Water Act* is directed at an extensive water licensing scheme, and as the glaciers are high in the mountains and are far from cities, roads, and even most towns, and thus far from water licenses, it is unlikely that the legislature intended to include glaciers within the scope of the legislation.

Rather, it is far more likely that the word “solid” was included to make it clear that the *Water Act* applies to bodies of water regardless of whether they have frozen over the winter. This interpretation of the *Water Act* is supported by the water legislation in other provinces. Several provinces that do not have glaciers have similar or the same wording

37 In a Canlii search of the word “glacier,” 53 statutes and regulations came up. Fifty of these statutes and regulations use the word to designate a geographical location, a name, or a place. Only three of these search results regulated activities in or around a glacier, but none of them have any effect in Alberta. Two come from British Columbia and the one federal regulation, the *National Parks of Canada Aircraft Access Regulations*, SOR/97-150 only prohibits take-offs and landings on particular glaciers in the Yukon and Northwest Territories.

38 *Dunvegan Hydro Development Act*, SA 2009, c D-18.

39 *Activities Designation Regulation*, Alta Reg 276/2003, s 2(1)(a); *Activities Designation Regulation*, Alta Reg 211/1996, s 2(1)(a); *Mines Safety Regulation*, Alta Reg 292/1995, s 212(2)(g). Both glacial fluvial deposits and glacial fill refer to the solid rocks and other debris that is deposited or moved by glaciers, but does not refer to the ice or water itself.

40 *Water Act*, *supra* note 31.

41 There is no case law on this provision of the *Water Act*.

42 *Water Act*, *supra* note 31, s 1(fff) [emphasis added].

43 *Ibid*, s 3(2).

44 Ruth Sullivan, *Statutory Interpretation*, 2nd ed (Toronto: Irwin Law, 2007) at 175-178.

in their legislation. For instance, Manitoba's *Water Protection Act* has almost identical language, and yet, Manitoba has no glaciers.⁴⁵ Prince Edward Island's *Environmental Protection Act*⁴⁶ refers to "frozen" bodies of water, and the Nova Scotia *Water Protection Act*⁴⁷ refers to "ice." Neither of these provinces have glaciers either. While these words differ slightly from Alberta's legislation, they effectively have the same meaning. It is unlikely, then, that Alberta would have used the same language in order to capture a completely different geographical phenomenon.

This idea receives further credence from the fact that British Columbia, the only other province whose glaciers substantially contribute to their water supply, recently changed their water legislation to explicitly include glaciers. While the previous BC *Water Act*⁴⁸ did not have any language of "solid," "frozen," or "ice," it did refer to "source of water supply" in the definition of "stream."⁴⁹ However, in the new legislation, the *Water Sustainability Act*,⁵⁰ the definition of "stream" was expanded to include glaciers.⁵¹ While this legislation is not yet in force, it is clear that if glaciers were implicit in the *Water Act*, then their addition to the *Water Sustainability Act* would not have been necessary.⁵² Following this logic, it is unlikely that Alberta's ambiguous language should be interpreted to include glaciers.

On the other hand, there are two strong arguments against this conclusion. First, the Yukon,⁵³ the Northwest Territories,⁵⁴ and Newfoundland and Labrador,⁵⁵ all have glaciers, and all use the language of "frozen" in their respective legislation. Unfortunately, even if one accepts that all of these jurisdictions intended to include glaciers, it does not get around the problem of *noscitur a sociis*, nor does it explain why they would use the same language as several other provinces that do not have glaciers. Moreover, many of the glaciers in the Yukon, the Northwest Territories, and Newfoundland and Labrador are arctic rather than alpine glaciers. This means that rather than contributing to the freshwater supply of the province, many of their glaciers melt or calf directly into the sea. It is more likely, then, that these provinces neither meant to include nor thought they included glaciers within the purview of their legislation.

The second point for including glaciers within the meaning of "solid" is that if the definition of "water" in the Alberta *Water Act* does not include glaciers, then 47 cubic kilometres of Alberta's water supply would not be protected or regulated by legislation. Not only does this seem to be a major oversight on the part of legislature, it seems to be a counter-productive interpretation of the provision. Despite this, the difference between the language in the *Water Act* and the realities of glaciers are so drastic that a mere read-in of glaciers into the legislation would be merely nominal. It would fail to capture the important scientific, economic, and water storage qualities of the glaciers. In fact, the extensive licensing scheme outlined in the *Water Act* would have no practical application on the glaciers to which they were extended.

45 *Water Protection Act*, CCSM 2005, c W-65, s 1(1).

46 *Environmental Protection Act*, RSPEI 1988, c E-9, s 2(d).

47 *Water Protection Act*, SNS 2000, c 10, s 2(c).

48 *Water Act*, RSBC 1996, c 483, s 1.

49 *Ibid.*

50 Bill 18, *Water Sustainability Act*, 2nd Sess, 40th Parl, British Columbia, 2014 (assented to 29 May 2014).

51 *Ibid.*, s 1(1).

52 There is no Hansard regarding the addition of this word.

53 *Waters Act*, SY 2003, c 19, s 1.

54 *Waters Act*, SNWT 2014, c 18, s 1.

55 *Water Resources Act*, SNL 2002, c W-4.01, s 2(1)(d).

After weighing the arguments for and against, it is highly unlikely that section 1(ff) of the *Water Act* does or should include glaciers within its scope. To include glaciers would not only lead to an absurdity and go against the principle of *noscitur a sociis*, it would have no practical effect on the management of Alberta's glaciers. The Alberta *Water Act*, then, does not govern glaciers.

ii. National & Provincial Parks

Since many of Alberta's glaciers can be found in parks,⁵⁶ the *Canada National Parks Act*⁵⁷ and the Alberta *Provincial Parks Act*⁵⁸ could theoretically provide clarity to the issue of the legal regime surrounding glaciers. Unfortunately, however, they provide little.

Both the *Provincial Parks Act* and the *Canada National Parks Act* have a dual mandate to maintain the enjoyment and benefits to human populations while ensuring that the landscape remains unimpaired for future generations.⁵⁹ While this dual mandate may implicitly cover glaciers, they do not explicitly mention them. Despite their silence on the issue, these statutes offer glaciers a layer of protection that they would otherwise not have. Because so many glaciers are found in national and provincial parks, mining development nearby has been a moot point. Moreover, in both statutes,⁶⁰ the parks have the power to remove recreational users who are causing harm to any part of the park, including the glaciers. However, the types of activities that occur in parks generally have only the potential to do minimal damage. At worst, someone could leave trash or drop gasoline on the glacier. These relatively minor issues are not the types of conflicts that warrant the development of a specific legal regime. As mentioned above, the major threats to glaciers are climate change and mining development, neither of which are contemplated in these statutes.

Luckily, these statutes bring one point of clarity. GLOFs are one of the major threats that melting glaciers pose to human populations. GLOFs occur when high alpine glacial meltwater lakes burst over their banks and send large volumes of water shooting down the mountain.⁶¹ While GLOFs have not been a problem in the Rocky Mountains, they have caused a great deal of damage in the Himalayas.⁶² Should a GLOF occur on a glacier within a provincial or national park, the respective level of government could be liable for any human damage that follows, particularly if the GLOF resulted from negligent maintenance of the glacier, or from failing to inform the public of the threat of a GLOF. While liability would depend on the precise situation, parks should be aware of the possibilities of GLOFs and should mitigate any potential damage that they might cause. If they fail to either identify or mitigate these GLOFs, it is likely that the parks would be liable.

Overall, neither the *Provincial Parks Act* nor the *Canada National Parks Act* clarify the legal regime of glaciers. While they do provide a layer of protection for the glaciers, and offer a solution for liability in the case of a GLOF, they do not answer questions of who gets priority when the glaciers melt, whether the glaciers are a public good, or whether there is a right to glaciers. In sum, these statutes are of limited use.

56 Ommanney, *supra* note 6 at J204.

57 *Canada National Parks Act*, SC 2000, c 32 [National].

58 *Provincial Parks Act*, RSA 2000, c P-35 [Provincial].

59 *Provincial*, *ibid*, s 3; *National*, *supra* note 57, s 4(1).

60 *Provincial*, *ibid*, ss 17-24; *National*, *ibid*, ss 18-22, 32.

61 Verheyen, *supra* note 14 at 281.

62 *Ibid* at 280-291.

iii. Climate Change Legislation

One might think that federal and provincial laws on climate change might regulate or protect glaciers. Unfortunately, this is not the case. Although the effects of climate change can be readily perceived on the world's glaciers, and climate change is currently the biggest threat to glaciers, neither provincial nor federal climate change laws or regulations mention glaciers. Rather, they are directed at reducing greenhouse gas emissions.⁶³

Importantly, these laws are incapable of addressing the effects of climate change on Alberta's glaciers, and thus on the changing realities of Alberta's water supply. This impotence means that the current climate change legislation in Canada falls short of providing any clarification in regards to the law around glaciers.

B. Common Law

Since statutory law provides minimal guidance, one should instead turn to the common law. In the common law, several types of rights arise in regards to water and its use. According to a CanLII search, there is no common law pertaining to rights to glaciers (*per se*) or to the application of common law water rights to glaciers. As Canada's common law came from England, and as glaciers are not a part of England's geographical landscape, this is not surprising. However, the common law can provide a lens through which to evaluate whether there is room for glaciers within the common law water rights. This section will examine common law riparian rights in the context of glaciers. It will conclude that riparian rights have no practical applicability in the context of glaciers, and thus are unlikely to be extended to glaciers.

i. Riparian Rights

Riparian rights are the rights arising out of owning land adjacent to bodies of water and riparian owners have the right to take and use water for ordinary personal use.⁶⁴ If either the quantity or quality of the water is interfered with by an upstream user, riparian proprietors can gain an injunction and obtain damages.⁶⁵

It would be difficult to apply riparian rights to glaciers for several reasons. First, people do not live along alpine glaciers in the same way that people live along rivers and lakes. Alpine glaciers in Canada are tucked away in the mountains and are far from cities, agricultural development, and, in almost every case, roads. The ability to have traditional riparian rights is then limited. Moreover, glaciers shrink and expand every year, so a home that would be directly attached to a glacier in the summer may be crushed by that same glacier in the winter. It may be possible to claim that the national and provincial parks have riparian rights to these glaciers, but the ordinary personal use provision would not apply.

Second, it would be difficult to apply riparian rights to glaciers because of the manner that water is contained within the glacier. In standard watercourses, water is liquid and can be collected as a liquid, even in the winter. The water contained within glaciers, however, is solid year-round and would thus have to be harvested as ice and melted to be utilized.

63 For example, see *Climate Change and Emissions Management Act*, SA 2003, c C-16.7; *Specified Gas Emitters Regulation*, Alta Reg 139/2007; *Renewable Fuels Regulation*, SOR/201-189.

64 *Keith v Corry*, (1877) 17 NBR 400; *La Forest*, *supra* note 30 at 224.

65 *KVP Co Ltd v McKie et al*, [1949] SCR 698, 4 DLR 497 [KVP]; *La Forest*, *ibid* at 214.

Finally, applying riparian rights to glaciers would be impractical due to the remedies available to violations of riparian rights. In a standard riparian situation, a riparian proprietor could sue someone upstream who has interfered with the quantity or quality of the water.⁶⁶ In a glacial setting, however, there are no upstream users and most of the damage that comes to glaciers arises from climate change. If there are riparian rights to glaciers, who can the riparian proprietor sue? Theoretically there could be multiple riparian users on the same glaciers, because glaciers store water in a static rather than fugitive manner, it is unlikely that any noticeable interference would occur.

It is therefore unlikely that the current common law regime of riparian rights would or could apply to glaciers as there are no glacial riparian owners, glacial water is solid rather than liquid, and the remedies provided to riparian owners are impractical when applied to glaciers.

After examining the applicable statutes and common law, it is probable that Alberta's current legal regime does not account for the realities of glaciers. Rather, there is a patchwork of laws that tangentially affect glaciers. In statutory law, neither the *Water Act*, the *Provincial Parks Act*, the *Canada National Parks Act*, nor the climate change laws provide any real guidance regarding the legal status of glaciers. Canada's common law water rights also do not give clarity as the primary common law water rights, riparian rights, do not logically apply to glaciers. In sum, glaciers are outside of Alberta's statutory and common law legal systems.

C. International Law

While Canada's domestic law is effectively silent in relation to glaciers, international law is not.⁶⁷ Specifically, the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses ("*UN Watercourses Convention*") includes glaciers within its definition of "a system of surface and groundwaters."⁶⁸ While the *UN Watercourses Convention* may concern other parts of Canada, at this time it has limited applicability to Alberta.

The *UN Watercourses Convention* was adopted in 1997 as a way to encourage better use and utilization of international watercourses.⁶⁹ It is a framework convention that lets each country apply and adjust it as deemed necessary. Most importantly, the *UN Watercourses Convention* adheres to the principle of equitable utilization.⁷⁰ Equitable utilization focuses on each State using a watercourse in a reasonable and shared manner.⁷¹ As such, equitable utilization can mean one thing for Canada but a completely different one for India. This means that protection of international watercourses can vary drastically throughout the world.

66 *KVP, ibid*; La Forest, *ibid*.

67 This section focuses exclusively on international law that is applicable to Canada. There are other international treaties, such as the *Alpine Convention* and the *Antarctica Treaty* that have developed more extensive legal regimes on glaciers. However, they are not relevant to the Canadian context and thus are not discussed.

68 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, 21 May 1997, 12 UNTS 52106 art 2(b) (entered into force 17 August 2014) [*UN Watercourses Convention*].

69 Owen McIntyre, *Environmental Protection of International Watercourses under International Law* (Aldershot: Ashgate Publishing Inc, 2007) at 1.

70 *UN Watercourses Convention*, *supra* note 68, art 5.

71 *Ibid*; Ibrahim Kaya, *Equitable Utilization: the Law of Non-Navigational Uses of International Watercourses* (Aldershot: Ashgate Publishing Inc, 2003) at 89-91.

While the word “glacier” does not appear in the *UN Watercourses Convention* it can be found in the UN provided commentary. The commentary to Article 2(b) defines “a system of surface and groundwaters” as a hydrological system, which includes glaciers.⁷² Merely being in the definition, however, does not mean that the *UN Watercourses Convention* actually applies to all glaciers. Rather, it likely only applies to glaciers that are integral to the water balance of an international watercourse.⁷³ An international watercourse means “a watercourse, parts of which are situated in different States.”⁷⁴ According to legal scholar Laurence Boisson de Chazournes, putting these definitions together in light of the convention’s prioritization of sharing means that many glaciers will be excluded from the statute.⁷⁵ For instance, glaciers that are not integral or contributing to international watercourses would not be covered under this Convention.⁷⁶

As a result, this law has limited applicability to Alberta’s glaciers. The only place where it could be applied is in the South Saskatchewan River Basin (“SSRB”), the only river basin in Alberta that both crosses into the United States and has glaciers.⁷⁷ As there is no clear map of all of the glaciers in Alberta, it is impossible to say whether any of the water in the southernmost tip of the SSRB originates in glaciers and, if it does, whether those glaciers are integral to the international watercourse. In sum, while international law has started to contemplate a legal regime for glaciers, that regime is particularly narrow and mostly inapplicable to Alberta.

III. GLACIER LAW CASE STUDIES & RECOMMENDATIONS FOR ALBERTA

Since domestic law provides minimal clarification in regards to glaciers, and the law of international watercourses has little applicability in Alberta, it follows that Alberta’s laws cannot respond to the *sui generis* nature of glaciers. Given that Alberta will likely face water shortages within the next century,⁷⁸ and that glaciers are the originating source of all of the rivers that run through Alberta’s major cities, it is only a matter of time until there is a conflict over Alberta’s glacial waters. The real question then is whether it will be addressed by the legislature or by the courts.

This article suggests that Alberta should be proactive in drafting legislation that protects and defines glaciers, rather than waiting for the matter to go to the courts. The reason for this is threefold. First, passing legislation before a conflict occurs may help to minimize opposition to the bill. Once litigation has started there will have been, by definition, a conflict. When there is a conflict, it means that there are competing rights, and therefore more opposition to any bill. Second, passing legislation could give the public an opportunity to be consulted. No such opportunity will be granted by the courts.⁷⁹ Finally, legislation on glaciers could be comprehensive, while a court decision will likely only address the particular issue before it. For these three reasons, drafting legislation on glaciers is preferable to waiting for the courts to decide upon the issue.

72 Commentary on United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, 21 May 1997, 12 UNTS 52106 art 2(b) (entered into force 17 August 2014).

73 De Chazournes, *supra* note 29 at 44-45.

74 *UN Watercourses Convention*, *supra* note 68, art 2.

75 De Chazournes, *supra* note 29 at 44-45.

76 See generally Fabienne Quilleré-Majzoub & Tarek Majzoub, “A qui Profitent les Eaux de Glaciers de Montagne” (2010) 51 *Les Cahiers de Droit* 69.

77 Alberta: Water Facts, *supra* note 21 at 8, 14.

78 D W Schindler & W F Donahue, “An Impending Water Crisis in Canada’s Western Prairie Provinces” (2006) 103:19 *Proc Natl Acad Sci USA* 7210 at 7212-7214.

79 Legislation could subsequently override any common law rules imposed by the courts.

Below are four case studies on the implementation, attempted or realized, of legislation on glaciers. After examining these cases studies, this article will provide suggestions for what equivalent legislation in Alberta should aim to do.

A. Glacier Protection Laws Around the World

Many countries around the world protect glaciers, either as an explicit part of their environmental protection schemes,⁸⁰ or, more recently, through specific legislation unto itself.⁸¹ Over the past decade legislatures around the world realized that their statutes were insufficient to govern glaciers and, some reactively and some proactively, implemented or proposed legislation that explicitly protects glaciers. In the next subsections, this article will examine four case studies: Kyrgyzstan, Argentina, Chile, and Switzerland. These examples demonstrate the benefits of having a proactive legislature and the pitfalls that come from waiting for a conflict to arise.

i. Kyrgyzstan

In 1992, the Kumtor Gold Company gained approval to start an open pit gold mine in the Tian Shan Mountains. This region, and specifically the mountain on which the open pit mine operated, is covered with glaciers. For almost twenty years, Kumtor and its Canadian operator, Centerra, have successfully mined substantial amounts of gold, but at a high environmental cost. From 1994 to 2011 they removed 39 million cubic metres of glacial ice, dumped waste on the glaciers that remained, and potentially caused long-term water pollution issues in the region.⁸² In addition, due to the high alpine location of the mine's tailings ponds, concerns arose over a tailings pond spill that could pollute waters all over central Asia. Despite these environmental concerns, the project was extended beyond its original 2014 end date and will now continue until at least 2023.

In 2014, the Kyrgyz Parliament passed the *Glacier Law*. This law laid out liability for glacier damage, prohibited development on glaciers, created an inventory for glaciers,⁸³ and was clearly aimed at projects such as Kumtor. While a translated version of the proposed Kyrgyz legislation could not be obtained, it is clear that the law would leave mining and other forms of industry liable for destruction and damage caused to glaciers at a rate to be determined by the government.⁸⁴ This uncertain liability both deters development on glaciers and gives the government an incentive to prosecute those who damage glaciers. Unfortunately, this law has never been signed by the President of Kyrgyzstan and thus

80 Peru, Colombia, Austria, Italy, and France are examples of regions that have incorporated glaciers into their other statutes. See Clare Shine & Cyrille de Klemm, *Wetlands, Water, and the Law: Using Law to Advance Wetland and Conservation and Wise Use: IUCN Environmental Policy and Law Paper No. 38* (Bonn, Germany: IUCN Environmental Law Centre, 1999).

81 See examples of Argentina, Chile, and Kyrgyzstan below.

82 Kronenberg, *supra* note 7 at 80-81. Some of the chemicals stored on the glacier have been absorbed into the glacier and may be making their way into the water supply. The effect on the water supply will not be known for many years.

83 Henry Lazenby, "Proposed Kyrgyz 'Glacier Law' Could Impact on Centerra's Kumtor Mine" (25 April 2014), *Mining Weekly*, online: <<http://www.miningweekly.com/article/effects-of-proposed-kyrgyz-glacier-law-uncertain-on-centerras-kumtor-mine-2014-04-25>> archived at <<https://perma.cc/C8UD-Z8DT>>.

84 Samantha Brletich, "Eurasian Heart of Gold: What is the Impact of Kumtor on Kyrgyzstan's Gold Mining Sector?" (22 January 2015), *Eurasia Review*, online: <<http://foreignpolicynews.org/2015/01/22/eurasian-heart-gold/>> archived at <<https://perma.cc/23GE-KSX4>>; Lazenby, *ibid.*

is not in force. Moreover, even if it were in force, it probably would be unable to stop the Kumtor project due to the arbitration clauses in the mining contract.⁸⁵ Thus, this important step in protecting Asia's glaciers has been left in legal limbo.

ii. Chile

In the early 2000's, Barrick Gold began a mining project, Pascua Lama, that takes place high in the Andes Mountains, right along the Argentine border and in close proximity to three small glaciers.⁸⁶ Shortly after the project surveying began, local and Indigenous communities learned of Barrick Gold's plan to dynamite and remove parts of the small glaciers in order to access the gold underneath.⁸⁷ These communities were outraged and set out to stop the development. In response to this public outcry, Barrick Gold changed course and decided not to remove any part of any glaciers.⁸⁸ The project has now gone ahead.⁸⁹

This incident brought international media attention to the issue of the protection of Chilean glaciers. For the past several years, there has been substantial international pressure on the country to put in place legal safeguards for their glaciers and in particular to protect them from mining development. However, due to the country's dependence on mining, the development of this law has been slow. Since 2013, several versions of the law have been proposed and rejected.⁹⁰ In March 2015 the newest version of the legislation was proposed.⁹¹ The new law allows for automatic protection of any area defined as a "glacier," assigns different classifications to different glaciers, and prohibits any activity that damages a glacier. This multi-layered approach provides extensive protection for glaciers within national parks (estimated to be 80-85% of Chile's glaciers), but only limited protection for all others.⁹² Under the proposed legislation, a Council of Ministers would make decisions regarding glaciers outside of national parks, potentially making these decisions vulnerable to extensive lobbying.

85 Market Wired, "Kyrgyz Parliament Passes Law on Glacier" (24 April 2014), *Market Wired*, online: <<http://www.marketwired.com/press-release/kyrgyz-parliament-passes-law-on-glaciers-tsx-cg-1903001.htm>> archived at <<https://perma.cc/2S5T-TVWD>>.

86 Kronenberg, *supra* note 7 at 83.

87 *Ibid.*

88 Barrick Gold, "Pascua-Lama Update – Questions and Answers", *Barrick Gold*, online: <<http://web.archive.org/web/20071011105043/http://barrick.com/CorporateResponsibility/Issues/PascuaLama/PascuaLamabrQA/default.aspx>> archived at <<https://perma.cc/98ZQ-HHQ2>>.

89 Barrick Gold, "Pascua-Lama FAQs", *Barrick Gold*, online: <<http://www.barrick.com/operations/argentina-chile/pascua-lama/faq/default.aspx>> archived at <<https://perma.cc/YKJ6-P83D>>. The project is currently under suspension for several reasons. One of the reasons was resolved in the Chilean Environmental Court on March 23, 2015. In 2013, local farmers had sued Barrick Gold for causing the three glaciers in question to melt faster due to dust from the mining operations. The court rejected the evidence put forward by the state scientists and instead followed the scientific evidence presented by Barrick Gold. Barrick Gold was held not responsible for damage done to the three glaciers in questions. "Science on Trial at Pascua Lama" (26 March 2015), *Glacier Hub*, online: <<http://glacierhub.org/2015/03/26/chile-environmental-court-rules-on-scientific-truth/>> archived at <<https://perma.cc/7FM7-3HJK>>.

90 Kristen French, "Will Chile Get its Five-Star Glacier Law?" (12 March 2015), *Glacier Hub*, online: <<http://glacierhub.org/2015/03/12/will-chile-get-its-five-star-glacier-law/>> archived at <<https://perma.cc/YW3P-LXUJ>>.

91 Unfortunately, no translated version of the law could be obtained. All information about the law has come from secondary sources.

92 *Ibid.*

iii. Argentina

The Argentine *National Glacier Act*⁹³ was the first legislation in the world dedicated to the protection of glaciers. The legislature enacted the law proactively in response to the situation in Chile and, comparatively, it came into effect without much incident. Although a first draft of the legislation was vetoed in 2008,⁹⁴ a second version of the law passed in 2010.⁹⁵ This law takes three important steps in protecting glaciers: it recognizes glaciers as a public good, creates the National Glacier Inventory, and prohibits development, specifically mining, to occur on glacial or periglacial regions.⁹⁶ Scientific and touristic development, however, are allowed on glaciers provided that they do no damage.⁹⁷ Although the mining industry in Argentina fought the legislation, they were ultimately unsuccessful and the law has been well-received.⁹⁸ The success of the Argentinian *Glacier Protection Law* should serve as an example for other countries to follow.

iv. Switzerland

Unlike the other case studies in this list, Switzerland has a long history of glacial regulation. The difference, though, is that the law is embedded in the Swiss Civil Code ("SCC") and is not about protecting glaciers but rather focuses on balancing touristic development with protection of the scenery that makes that tourism viable.⁹⁹ The SCC defines glaciers as objects with no owner, as having soil unsuitable for cultivation, and as public property for common use.¹⁰⁰ This definition of glaciers also includes the land immediately around the glaciers as well as the point at which the glacial waters enter streams, rivers, and lakes. Laws over individual glaciers, however, vary from canton to canton. In some cantons where land transfers occurred in the 19th or early 20th centuries, glaciers have been determined to be a part of privately owned land.¹⁰¹ In contrast, courts in other cantons have ruled that glaciers have never been and could never be part of land transfers.¹⁰² Interestingly, courts have found that transfers in any canton that were done before 1800 did not include glaciated areas because prior to that date, these areas had no useful value to landowners.¹⁰³

Switzerland faced substantial court disputes over glaciers in the late 20th century. This occurred for two reasons. First, many cantons and municipalities brought in legislation limiting development near glaciers, despite the fact that these areas are often popular for skiing and mountaineering. Private parties and companies have challenged these laws with varied success. These private entities want rights and permits to build infrastructure, such as cable cars, onto and over the glaciated areas. While the laws on cable cars require them to be environmentally safe, at least one scholar has argued that the current environmental protections are not strong enough to protect the glaciers.¹⁰⁴ Despite this, touristic development continues.

93 Argentine National Congress, Buenos Aires, 30 September 2010, *Argentine National Glacier Act: Minimum Standards Regime for the Preservation of Glaciers and the Periglacial Environment* [ANGA].

94 Taillant, *supra* note 29 at 62.

95 "Medio Ambiente", *InfoLeg*, online: <<http://www.infoleg.gov.ar/infolegInternet/anexos/170000-174999/174117/norma.htm>> archived at <<https://perma.cc/C9KF-5G6C>>.

96 ANGA, *supra* note 93, arts 3, 6.

97 *Ibid*, art 7.

98 Taillant, *supra* note 29 at 75-78.

99 Other European countries, such as France and Austria, have similar provisions in their legislation, *supra* note 79.

100 *Swiss Civil Code*, art 664.

101 One such example of a privately owned glacier is the Rhone Glacier which was determined to be owned by the Seiler family in 1936. Butler, *supra* note 7 at 19.

102 *Ibid*.

103 *Ibid* at 20.

104 *Ibid* at 25.

Second, due to the rise in popularity of alpine tourism, there have been more glacier-related accidents. For instance, there was an extended court battle over the 1965 glacier tragedy in Mattmark. The tragedy occurred in August 1965 when the tongue of the Allain Glacier calved from the mountain and fell directly on top of a construction project being built underneath it, killing 88 people instantly.¹⁰⁵ In addition to infrastructure hazards, the courts have also ruled on proper alpine technique. They have come up with several rules of negligence for glacier and mountaineer guides, such as roping in on a glacier when the route is partially or completely covered in snow.¹⁰⁶

While Switzerland's glacier laws may be imperfect, they are quite extensive. Unlike Kyrgyzstan, Chile, and Argentina, Switzerland has used the law to carve out a complex balancing scheme where glaciers' economic value, intrinsic value, and "water tower" value are all contemplated, albeit with a particular emphasis on economic development. This legal regime stands in stark contrast to Alberta's limited laws.

B. Summary Recommendations for Alberta

These case studies provide several lessons for any legislation in Alberta that would protect its glaciers. First, any Albertan legislation would need to consider the potential mining development that might occur around glaciers. While mining development near glaciers is a problem in other parts of the world, such as in Chile and Kyrgyzstan, so far, it has not been an issue in Alberta. However, as the price of oil diminishes and new types of mining become more important, protective legislation will become more necessary. The case studies of Chile and Kyrgyzstan demonstrate that it is easier to pass this legislation before any mining takes place, not after. Thus, Alberta should be proactive in establishing these protections.

Second, the case studies of Argentina and Switzerland demonstrate the importance of balancing touristic development and scientific research with glacier protection and safety. This is an important issue for Alberta, as glacier tourism has increased over the past few decades, particularly on the Athabasca Glacier.¹⁰⁷ While Argentina has taken the approach that any touristic development cannot compromise the health of the glacier, Switzerland has developed a rigorous regulatory scheme for glacial tourism. Alberta should emulate these approaches in order to make sure that any future development does not jeopardize the glaciers. Like with mining development, however, any action here will be mostly proactive, rather than reactive.

Third, Alberta should follow the lead of Argentina, Chile, and Kyrgyzstan and begin drafting legislation that recognizes and is directed at the *sui generis* nature of glaciers. This is vital. Merely incorporating glaciers into other existing legislation, such as British Columbia has done, fails to recognize the multitude of purposes that glaciers serve.¹⁰⁸

Fourth, like in Chile, different levels of protection should be afforded to glaciers depending on their location inside or outside of parks. These layers of protection will make sure that while most glaciers are protected extensively, economic development outside the parks will continue. Within this multi-layered approach, there should be a base layer of protection for areas identified as glaciated.

¹⁰⁵ *Ibid* at 20-21.

¹⁰⁶ *Ibid* at 21.

¹⁰⁷ CPAWS Report, *supra* note 18; Brewster Travel Canada, "Glacier Skywalk", online: <<http://www.brewster.ca/activities-in-the-rockies/brewster-attractions/glacier-skywalk/#/0>> archived at <<https://perma.cc/3XTS-D3YA>>.

¹⁰⁸ Given that many of Alberta's glaciers are on federal land, the federal government would need to pass a companion law. Without this collaboration, any law that Alberta enacts would only apply to a portion of its glaciers.

Fifth, and most controversially, a right to glaciers needs to be contemplated. This could be dealt with either by simply calling glaciers a “public good,” or by developing a more elaborate rights scheme. The more elaborate scheme could contemplate downstream priority to the water, whether chunks of glaciers could be removed and sold, and whether Albertans have a higher priority than other Canadians to the water in the glaciers.

Contemplating a right to glaciers could also force the government to consider how they will address future water shortages caused by climate change. As glaciers retreat further each year, it means that eventually they will be unable to provide the same amounts of water to the freshwater system as they currently do. This will exacerbate droughts and could likely make Alberta a drier province overall. By contemplating a right to glaciers, the government could pre-empt this retreat of the water supply and could potentially better conserve water flow. As climate change is the biggest threat facing glaciers, action on the right to glaciers should happen as soon as possible.

Finally, and most importantly, Alberta should not wait for a conflict to occur, be it over water ownership or over mining development. Not only do conflicts mean that the bill would be more controversial, it would also take longer. The Albertan and Canadian parliaments should start moving towards this legislation at a time when the political costs are low. Many of Alberta’s glaciers are located within parks so the push-back from the mining community can be expected to be minimal. Moreover, this could improve Canada’s poor environmental reputation. If Alberta and Canada wait, they may face greater pressures as climate change pushes these issues to the forefront of political discussion.

CONCLUSION

This article attempts to answer two questions. First, is there currently a legal regime for glaciers in Alberta? Second, if not, what should an effective regime look like? The answer to the first question is almost certainly no. The *Water Act*, the *Provincial Parks Act*, the *Canada National Parks Act*, and climate change laws do not provide any real guidance regarding the legal status of glaciers. The definition of “water” in the *Water Act* is too ambiguous and broad to include glaciers. The provincial and federal parks acts provide a general layer of protection for glaciers within their boundaries, but say nothing in relation to glaciers specifically. Provincial and federal climate change acts and regulations are silent on glaciers and instead focus on the reduction of greenhouse gas emissions. Canada’s common law water riparian rights do not logically apply to the reality of glaciers, and thus add nothing to the legal regime. International law could theoretically provide guidance through its principle of equitable utilization, but this principle is legally inapplicable to the glaciers of Alberta. In conclusion, there is no current legal regime on glaciers in Alberta.

Alberta should look to create legislation that is aimed directly at glaciers and that encompasses their threefold purposes. In designing such legislation, Alberta should look to the mistakes and successes of the laws in South America, Europe, and Asia. Is there a right to glaciers? Who gets priority to the water in glaciers? Who is liable when there is damage to glaciers? These questions are particularly important as Alberta looks towards a future with far fewer glaciers, and thus with far less water in the freshwater system. Proactive legislation would protect this unique economic and environmental resource for Albertans and Canadian for decades to come.