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A Citizen's Guide to Ecology and Law in Alberta

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List of Tables

	Page
Table 1: Environmental Laws in Alberta and the Regulated Environmental Component	29

List of Figures

	Page
Figure 1: Hierarchy and landscape scale at which environmental laws are applied	9
Figure 2: Critical elements of an environmental governance system	17
Figure 3: Human ecosystem within the Calgary Metropolitan Area	24

Abstract

Many Albertans do not have sufficient understanding of ecology or ecosystems to participate effectively in government regulatory approval processes, for example, when making oral and written submissions at public hearings before land-use decision makers.

Alberta's legal system for regulating and controlling human interactions, activities, and institutions (human activities) in the natural world consists of a body of "environmental laws." The "environment" is defined in Alberta's *Environmental Protection and Enhancement Act* (EPEA) as "the components of the earth and includes air, land and water; all layers of the atmosphere; all organic and inorganic matter and living organisms; and the interacting natural systems that include the components of the environment referred to." This definition of environment reflects a very basic understanding of ecosystems and clarifies that the environment includes people because we are living organisms interacting in the natural world.

However, when citizens refer to the environment, they refer to the various components listed in the definition of the environment. Many perceive humans as acting outside of the ecosystem, trying to control nature's dynamics, rather than as critical components interacting within the ecosystem.

The government tries to regulate human activities within ecosystems 'component by component,' creating laws and procedures that provide as much certainty as possible. However, natural systems are complex and self-organizing and therefore unpredictable. Generally, Alberta's environmental laws ignore the complex functions, interactions, and critical relationships among ecosystem components, especially human activities that have major cumulative impacts and unintended consequences. Environmental laws are slow to change, while ecosystems can change suddenly, defying human modelling and predictions and the regulations and codes of practice put in place that reflect known science.

In Alberta, as elsewhere in the world, complex, dynamic social-ecological systems (SES), where social and ecological systems have become inextricably connected, have emerged as a result of human activities in the ecosystem. A good example of a SES is an irrigation system with dams, reservoirs, water diversions, weirs, canals, pipes, spigots, and other irrigation infrastructure that deliver water to dry lands. Natural water bodies that supply water to an irrigation system no longer exist separately from human culture, social institutions, and physical infrastructure. However, in places and during times of water scarcity, irrigation systems prove useless: the society that relies on irrigation must adapt and evolve and may even move on. In many jurisdictions, environmental laws ignore emergent phenomena that arise from within SES until crises occur, such as resource scarcity, drought, floods, wildfire, and famine.

This paper is intended to fill a knowledge gap for Albertans about ecology basics and provincial laws that attempt to regulate and control human activities in ecosystems. Understanding the rudiments of ecology will help people participate more effectively in municipal and provincial decision-making processes when applications are made for licenses, approvals, permits, and other authorizations to divert, use, or negatively impact components of the environment. The goal is to help people see human activities as critical components of ecosystems on Earth.

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List of Acronyms

Acronym	Description
ALSA	<i>Alberta Land Stewardship Act</i>
Catalysts for change	Catalysts for change, adaption, and evolution
CEM	Cumulative effects management
CEPA	Canadian Environmental Protection Act
EPEA	<i>Environmental Protection and Enhancement Act</i>
Human activities	Human interactions, activities, and institutions
LUF	<i>Alberta Land-use Framework</i>
MGA	<i>Municipal Government Act</i>
Province	Province of Alberta, Alberta
SES	Social-ecological systems
SSRP	<i>South Saskatchewan Regional Plan, 2014-2024</i>
SSRP Frameworks	SSRP Surface Water Quality Management Framework and SSRP Air Quality Management Framework

Table of Contents

<i>Acknowledgements</i>	<i>iv</i>
<i>List of Tables</i>	<i>v</i>
<i>List of Figures</i>	<i>vi</i>
<i>Abstract</i>	<i>vii</i>
<i>List of Acronyms</i>	<i>viii</i>
<i>Table of Contents</i>	<i>ix</i>
1. Why learn about ecology and the law in Alberta?	1
2. What are ecology and ecosystems?	1
3. Ecology: rudimentary concepts and terminology	3
4. What are environmental laws?	4
5. The complexity of environmental laws	6
6. Natural regions and land use regions in Alberta	10
7. What are complex, dynamic social-ecological systems?	11
8. Environmental governance is part of human ecology	16
9. Cumulative effects of human activities on Alberta's ecosystems	19
10. How might understanding basic ecology and Alberta's legal subsystem of environmental governance help citizens write effective submissions?	21
11. Recommendations to improve regulatory approval processes and eventual decisions through enhanced understanding of ecosystems	26
12. Conclusion	28
<i>Appendix A</i>	<i>29</i>

1. Why learn about ecology and the law in Alberta?

Key concepts and terms to explore:

- Anthropocentric
- Catalysts for change, adaption, and evolution (catalysts for change)
- Ecosystem dynamics
- Human activities, interactions, and institutions (human activities)

Many Albertans do not have sufficient understanding of ecology or ecosystems to participate effectively in regulatory approval processes, for example, when making submissions at public hearings before provincial natural resource regulators or municipal land-use decision makers.

This paper fills a knowledge gap about the basics of ecology and how Alberta's complex and evolving legal system regulates and controls *human activities, interactions, and institutions (human activities)* within ecosystems. Understanding the rudiments of ecology and the complexity of Alberta's environmental laws will help the general public participate more effectively in environmental policy development and decision-making processes. This understanding may help people understand that all human activities affect *ecosystem dynamics*.

Ecosystem dynamics are changes in ecosystem structure caused by environmental disturbances or by interactions among biotic (living) and abiotic (natural, non-living) components within the ecosystem. Human activities are often the *catalysts for change, adaption, and evolution (catalysts for change)* of ecosystems, altering structure and impeding ecosystem functions.

Citizens who read this paper because they want to participate in government decision-making processes may come to understand that Alberta's environmental laws are *anthropocentric* and do not necessarily protect the environment or reflect scientific knowledge about ecosystem dynamics. The first step is to recognize that people are living organisms (biotic components of the ecosystem). The second step is to learn how to become more effective writers and speakers when making submissions about ecology and the law. The third step is to learn how to participate in environmental governance to help sustain human existence on the planet.

2. What are ecology and ecosystems?

Key concepts and terms to explore:

- Biosphere
- Ecology
- Ecosystem ecology
- Ecosystems
- Human ecology

Ecology is a branch of biology. Ecologists study the relationships and vital connections between living organisms and their physical environment.¹ For example, to survive through a Canadian

¹ ESA, "What is Ecology: What does ecology have to do with me?" (Accessed July 20, 2021) online: *Ecological Society of America* <https://www.esa.org/about/what-does-ecology-have-to-do-with-me/>.

winter, a green frog needs interacting biotic and abiotic components found in a permanent source of water that does not freeze to the bottom in winter.²

An *ecosystem* is a network of interconnected biological communities interacting within an identifiable physical space. A riparian ecosystem is an example of an ecosystem that emerges at the interface between water and land, where to survive certain types of flora and fauna require soils saturated with water in different amounts, at different depths, and during different seasons and times of the year.

Ecosystem ecology is very complex, large-scale, and multidisciplinary.³ Ecosystem ecologists study the complex patterns produced by interacting ecosystems, including their abiotic features and the movement and release of energy, nutrients, and other materials. The *biosphere* is the largest known ecosystem, encompassing all other interacting ecosystems on the planet.

Some ecologists focus on *human ecology*: the study of people and their effect on each other, on other organisms, and on the physical environment in which humans exist. Human existence within the biosphere has been studied for many years.⁴

Some human ecologists have determined that people have become the most dominant species in all ecosystems on Earth; they say that human activities are having profound impacts on the planet's long-term sustainability.⁵

The Biosphere

The idea of the biosphere was introduced into science rather casually almost a century ago by the Austrian geologist Eduard Suess, who first used the term in a discussion of the various envelopes of the earth in the last and most general chapter of a short book on the genesis of the Alps published in 1875. The concept played little part in scientific thought, however, until the publication, first in Russian in 1926 and later in French in 1929 (under the title La Biosphere), of two lectures by the Russian mineralogist Vladimir Ivanovitch Vernadsky. It is essentially Vernadsky's concept of the biosphere, developed about 50 years after Suess wrote, that we accept today.

G. Evelyn Hutchinson, 'The biosphere.' *Scientific American* 223, no. 3 (1970): 44-53 at 1.

² CWF, "Green Frog," online: *Canadian Wildlife Federation* <https://cwf-fcf.org/en/resources/encyclopedias/fauna/amphibians-and-reptiles/green-frogs.html>. Accessed October 1, 2021.

Tolerant of a wide range of habitats, green frogs can be found even in urban areas provided there is a permanent source of water. Their preference is for the weedy areas of warm ponds, lakes, and shallow marshes. Farm ponds are generally ideal habitat for green frogs as they tend to be deep enough to provide a year-round water supply that doesn't freeze to the bottom in winter.

Ibid.

³ Biology Dictionary, "Ecology," online: *Biology Dictionary* <https://biologydictionary.net/ecology/#:~:text=Ecology%20is%20the%20branch%20of,different%20selective%20pressures%20on%20organisms>. Accessed on October 1, 2021.

⁴ Carl Zimmer, "The Lost History of One of the World's Strangest Scientific Experiments" (2019), online: *New York Times* <https://www.nytimes.com/2019/03/29/sunday-review/biosphere-2-climate-change.html>.

⁵ Carl Folke et al, "Social-ecological Resilience and Biosphere-based Sustainability Science" (2016) 21:3 *Ecol Soc*, online: <http://www.jstor.org/stable/26269981> [Folke et al]. See also Carl Folke et al, "The problem of fit between ecosystems

3. Ecology: rudimentary concepts and terminology

Key concepts to explore:

- Community
- Organism
- Population
- Scales

Ecology is a complex scientific discipline within the field of biological studies that has evolved considerably since the 1890s.⁶ The concepts provided below may help citizens understand terminology used in ecologists' reports submitted to regulators along with applications for licences, approvals, and other permits to authorize human activities within ecosystems.

Ecologists study interactions among living things within the physical environment at different *scales*. They may study an *organism* or organisms within a *population*, a *community*, an *ecosystem*, or the *biosphere*. Human ecologists study people from an ecological perspective at these same scales. The study of human ecology is necessarily multidisciplinary.

- **Organism:**

Organismal ecologists study adaptations, beneficial features arising by natural selection that allow organisms to live in specific habitats. These adaptations can be morphological, physiological, or behavioral.

- **Population:**

A population is a group of organisms of the same species that live in the same area at the same time. Population ecologists study the size, density, and structure of populations and how they change over time.

- **Community:**

A biological community consists of all the populations of different species that live in a given area. Community ecologists focus on interactions between populations and how these interactions shape the community.

- **Ecosystem:**

An ecosystem consists of all the organisms in an area, the community, and the abiotic factors that influence that community. Ecosystem ecologists often focus on flow of energy and recycling of nutrients.

- **Biosphere:**

The biosphere is planet Earth, viewed as an ecological system. Ecologists working at the biosphere level may study global patterns—for example, climate or species distribution—interactions among ecosystems, and phenomena that affect the entire globe, such as climate change.⁷

and institutions: ten years later" (2007) 12:1 Ecol Soc 30 at 33, online:

<http://www.ecologyandsociety.org/vol12/iss1/art30/> ("We have learned that we now live in the era of the Anthropocene in which Earth system processes from local to global scales are strongly shaped by humanity").

⁶ See Robert Goodland, "History of Ecology" (1975) 188:4186 Science 313 at 313.

⁷ Khan Academy, 'Ecology at Many Scales,' (Accessed on July 2, 2021), online:

<https://www.khanacademy.org/science/biology/ecology/intro-to-ecology/a/what-is-ecology>.

4. What are environmental laws?

Key concepts and terms to explore:

- Common law
- Environment
- Environmental laws
- Principle of *parens patriae*
- Social systems
- Statutes in *pari materia*
- Water quality and water quantity

Human ecology includes the study of legal systems found in different jurisdictions at different geo-political landscape scales (for example, federal, provincial, and municipal). A **legal system** is just one component of a complex, dynamic **social system**.⁸ Legal systems exist in all human societies, and continually change and evolve in response to feedback from other interacting subsystems of the society.

Alberta's legal subsystem emerged through legislative processes provided for in the Canadian Constitution⁹ and the **common law** (British Commonwealth rules, court decisions, and legal precedents) that have been handed down through the centuries. The Province's environmental legal system includes the common law and **environmental laws, regulations, and bylaws** (**environmental laws**) enacted by Parliament, the Alberta Legislature, and municipal councils.

Alberta municipalities are not a level of government: they are 'creatures of the provincial government,' exercising powers delegated to them through the *Municipal Government Act*.¹⁰ All municipal bylaws, including land use bylaws, are subject to the MGA and any other enactment, unless the MGA or another enactment states otherwise.¹¹ Only recently has the Province added the municipal purpose to the MGA of 'fostering the well-being of the environment.'¹² However, the Province did not provide any specific delegated authority to protect or conserve local ecosystems.

Underlying Alberta's environmental legal system are policies that reflect political beliefs, cultural norms, and power structures of Canadian and Albertan societies. Policies adopted by federal, provincial, or municipal governments inform and drive the eventual enactment of environmental laws and the adoption of administrative procedures and forms of coercion to ensure compliance.¹³ Government environmental policies also provide directives and guidance to the administrative arm of government, and usually reflect how the majority of citizens expect governments to respond to

⁸ See Niklas Luhmann, "Law as a social system" (1988) 83 Nw UL Rev 136 [Luhmann].

⁹ For a complete list of the legislation that is included in the Canadian Constitution, see *Constitution Act, 1982*, s 52(2), being Schedule B to the Canada Act 1982 (UK), 1982, c 11.

¹⁰ *Municipal Government Act*, RSA 2000, M-26.1 [MGA].

¹¹ See in depth discussion in Judy Stewart, "Municipal Direction, Control and Management of Local Wetlands and Associated Riparian Lands: Section 60 of Alberta's Municipal Government Act." (2009) *Alta. L. Rev.* 47:73.

¹² Judy Stewart, "Do Recent Amendments to Alberta's Municipal Government Act Enable Management of Surface Water Resources and Air Quality." (2017) *Alta. L. Rev.* 55: 1009 [Stewart 2017].

¹³ Judy Stewart, "Alberta's Riparian Land Governance System" (2020) CIRL Occasional Paper #73, online: *Canadian Institute of Resources Law* <https://cir.ca/sites/default/files/Occasional%20Papers/Occasional%20Paper%20%2373.pdf> [Stewart 2020].

repeating or emergent environmental problems.¹⁴ However, government policies are not legal instruments like laws, regulations, or codes of practice and cannot be enforced through Alberta's court system. This fundamental difference between environmental policies and environmental laws is not well understood by Albertans.

Environmental laws first emerged in Canada from the common law tort of nuisance to control the release of substances into the environment that negatively impacted human health and well-being.¹⁵ In turn, governments enacted early pollution laws in response to judges' rulings that citizens and corporations had obligations to do no harm to their neighbours and private property.¹⁶ The release of known toxins onto the land and into the air and water became highly regulated, with fines and penalties applied to people who did not comply with the environmental laws, or the terms and conditions in environmental licenses, approvals, and other authorizations.

Typical environmental laws are anthropocentric in that they protect the health and property of people under the principle of *parens patriae*: the government is regarded as the legal protector of citizens unable to protect themselves. Environmental laws are *not* enacted to protect the environment or the ecosystem.¹⁷ As a result, many people perceive that people are actors operating

¹⁴ Stewart 2020, *supra* note 13.

¹⁵ Jason W Neyers & Jordan Diacur, "What (is) a Nuisance? Antrim Truck Centre Ltd v Ontario (Minister of Transportation)" (2012) 90:1 Can Bar Rev 213, online: *CanLII* <https://canlii.ca/t/28j3>. Accessed on October 16, 2021.

¹⁶ See David Grinlinton, "The continuing relevance of common law property rights and remedies in addressing environmental challenges" (2017) 62:3 McGill L J 633. See also Tim Wood, "Sticks and Carrots: Rylands v Fletcher, CSR, and Accountability for Environmental Harm in Common Law Jurisdictions" (2012) 91:2 Can Bar Rev 275, online: *CanLII* <https://www.canlii.org/en/commentary/doc/2013CanLIIDocs172#!fragment//BQCwhgziBcwMYgK4DsDWszIQewE4BUBTADwBdoByCgSgBplTCIBFRQ3AT0otokLC4EbDtyp8BQkAGU8pAELcASgFEAMioBqAQOByAYRW1SYAEbRS2ONWpA>. Accessed October 12, 2021. For more information on how the environment is protected through court decisions, see Allan E Ingleson, ed, *Environment in the Courtroom* (Calgary: University of Calgary Press, 2019), online: *CanLII* <https://canlii.ca/t/1n4>. Accessed on October 2, 2021.

¹⁷ See Monique Evans, "*Parens Patriae* and Public Trust: Litigating Environmental Harm Per Se" (2016) 12:1 McGill Int'l J Sust Dev L & Pol'y 1.

Statutory regulation is the primary system for controlling environmentally hazardous activities and curbing pollution in Canada. However, where regulation leaves gaps or fails to keep pace with industry, toxic tort litigation plays a crucial role in deterring and compensating environmental damage. The traditional aim of tort law is to compensate individuals who have suffered some harm or damage due to another person's actions, such as physical injury to the person, property damage, or consequential loss—financial loss consequent on some injury to the plaintiff or damage to the plaintiff's property. This understanding of harm in tort law is an anthropocentric one, strictly centered on human interests. In tort, harm is particularly concerned with individuals and private property. If a goal of toxic tort litigation is environmental protection, then a purely anthropocentric view of harm is inadequate to achieve that purpose. In order to provide greater protection for the environment, the public must be able to deter polluters by litigating "environmental harm per se": environmental harm that is harm for the simple fact that it is damaging to the environment, rather than because it causes direct damage to private land or an individual.

Ibid. See also Lynda Collins & Heather McLeod-Kilmurray, *The Canadian Law of Toxic Torts* (Toronto: Canada Law Book, 2014) at ix (toxic tort litigation is litigation of "torts arising from environmental contamination or a toxic product"); Mark Wilde, *Civil Liability for Environmental Damage: Comparative Analysis of Policy in Europe and the US*, 2nd ed (The Netherlands: Kluwer Law International, 2013) at 11; David Hughes et al, *Environmental Law*, 4th ed (London, UK: Butterworths, 1996) at 135.

outside the ecosystem trying to control ecosystem dynamics rather than critical catalysts for change interacting with other components within the ecosystem.

Therein lies the first critical disconnect between ecology and the law: environmental laws are concerned with protecting people and their private property, whereas people are just one component interacting with all other components within ecosystems.

The second critical disconnect is that environmental laws do not necessarily account for the fact that ecosystems may need to be protected from human activities that negatively affect ecosystem dynamics and lead to loss of ecosystem function.

5. The complexity of environmental laws

Key concepts and terms to explore

- Complexity
- Emergent phenomena
- Scarcity
- Water scarcity

The *complexity* of any society's environmental laws usually increases during periods of rapid population growth, extensive economic development, and the resultant scarcity of shared natural resources. *Scarcity* drives scientific and technical innovation and adaptation to resolve problems among stakeholders who have similar but competing interests in a depleted resource.¹⁸

Water scarcity in southern Alberta provides a good example of this *emergent phenomenon*. In the early 1900s when the Province was being settled, governments could not foresee the extent of water scarcity that currently exists in southern Alberta.¹⁹ As water scarcity persists or increases, the complexity of laws also increases at all geo-political landscape scales to address competition among stakeholders for limited supplies of water.

The “environment” is defined in Alberta’s *Environmental Protection and Enhancement Act* (EPEA)²⁰ to mean “the components of the earth and includes air, land and water; all layers of the atmosphere; all organic and inorganic matter and living organisms; and the interacting natural systems that include the components of the environment.”²¹ This definition reflects a basic understanding of ecosystems and supports the notion that humans are living organisms that interact with other biotic and abiotic components of the environment.

The EPEA, the *Water Act*, the *Public Lands Act*, the *Agricultural Operations Practices Act*, the *Forests Act*, the *Wildlife Act*, the *Parks Act*, the *Mines and Minerals Act*, the *Oil and Gas Conservation Act*, and the *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage*

¹⁸ See Elinor Ostrom, 1990. *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge, UK: Cambridge University Press); Elinor Ostrom, “Polycentric Systems for Coping with Collective Action and Global Environmental Change” (2010) 20:4 *Global Environmental Change* 550 [Ostrom2].

¹⁹ DW Schindler & WF Donahue, “An impending water crisis in Canada's western prairie provinces” (2006) 103:19 *Proceedings of the National Academy of Sciences* 7210.

²⁰ *Environmental Protection and Enhancement Act*, RSA 2000, c E-12. [EPEA]

²¹ *Ibid*, s 1(t).

Rangelands Act (Wilderness Areas Legislation) are all examples of provincial laws that regulate pollution of the environment as well as human allocation and use of biotic and abiotic components of the environment.²²

The Wilderness Areas Legislation is an example of an emergent Alberta law that regulates human activities in ecologically significant landscapes.²³ As an interesting note, “ecosystems” and “natural ecosystems” are not defined in the Wilderness Areas Legislation except in direct relation to human activities. The legal provisions put in place to protect wilderness areas, ecological reserves, and natural areas are basically anthropocentric.

The EPEA definition of the environment above mirrors the federal definition found in the *Canadian Environmental Protection Act, 1999*²⁴ and can be imported into other legislation (such as all the statutes listed above as well as the MGA through the well-known principle of statutes *in pari materia*.²⁵ This is a rule of statutory interpretation explained by the English High Court in the 18th century: “Where there are different statutes *in pari materia* though made at different times, or even expired, ... and not referring to each other, they shall be taken and construed together, ... and as explanatory of each other.”²⁶

²² *Water Act*, RSA 2000, c W-6; *Public Lands Act*, RSA 2000, c P-40; *Agricultural Operations Practices Act*, RSA 2000, c A-7 [AOPA]; *Forests Act*, RSA 2000, c F-22; *Wildlife Act*, RSA 2000, c W-10; *Provincial Parks Act*, RSA 2000, c P-35; *Mines and Minerals Act*, RSA 2000, c M-17; *Oil and Gas Conservation Act*, RSA 2000, c O-6; and *Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act*, RSA 2000, c W-9 [Wilderness Areas Legislation].

²³ By excluding some types of human activities, the Wilderness Areas Legislation is the closest Alberta has come to enacting legal provisions to protect natural ecosystems. Under the heading titled “[e]cological reserves,” section 4(1) of the Wilderness Areas Legislation reads:

4(1) Subject to section 4.2, the Lieutenant Governor in Council, in order to preserve public land for ecological purposes, may designate as an ecological reserve any area of public land that, in the opinion of the Lieutenant Governor in Council, (a) is suitable for scientific research associated with the studies of natural ecosystems, (b) is a representative example of a natural ecosystem in Alberta, (c) serves as an example of an ecosystem that has been modified by humans and that offers an opportunity to study the recovery of the ecosystem from that modification, (d) contains rare or endangered native plants or animals that should be preserved, or (e) contains unique or rare examples of natural biological or physical features.

Wilderness Areas Legislation, *supra* note 22, s 4(1).

²⁴ *Canadian Environmental Protection Act*, 1999, SC 1999, c 33 [CEPA].

²⁵ Arlene Kwasniak, “Slow on the Trigger: The Department of Fisheries and Oceans, the Fisheries Act and the Canadian Environmental Assessment Act” (2004) 27:2 Dal LJ 347 at 368. “When statutes enacted by a legislature deal with the same subject matter they are assumed to be drafted with each other in mind. As Sullivan and Driedger point out in *Construction of Statutes*, all statutes of government are presumed to be drafted to produce a consistent and coherent whole.” *Ibid*.

²⁶ *R v Loxdale* (1758), 1 Burr 445, 97 ER 394 (KB (Eng)) at 395. Elsewhere, speaking for the Supreme Court of Canada, Justice Rothstein stated:

Lord Mansfield explained this principle in *R. v. Loxdale* (1758), 1 Burr. 445, 97 E.R. 394, observing that “[w]here there are different statutes *in pari materia* though made at different times, or even expired, . . . they shall be taken and construed together . . . and as explanatory of each other” (p. 395). Estey J. provided a more modern explanation of this principle, and explained how “sometimes assistance in determining the meaning of [a] statute can be drawn from similar or comparable legislation within the jurisdiction or elsewhere” (*Nova, an Alberta Corp. v. Amoco Canada Petroleum Co.*, 1981 CanLII 211 (SCC), [1981] 2 S.C.R. 437, at p. 448).

Sharbern Holding Inc v Vancouver Airport Centre Ltd, 2011 SCC 23 at para 117.

CEPA also provides a definition of an ‘ecosystem’ that seems to exclude humans: “ecosystem means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.”²⁷ Compare this to Alberta’s definition of ecosystem in the policy document the *Land-use Framework* (LUF)²⁸ that preceded the enactment of the *Alberta Land Stewardship Act* (ALSA).²⁹ In the LUF, ecosystem is defined as the “interaction between organisms, including humans and their environment.”³⁰ The LUF goes on to explain that “[e]cosystem health/integrity refers to the adequate structure and functioning of an ecosystem, as described by scientific information and societal priorities.”³¹ Alberta’s assessment of ecosystem health or integrity is therefore anthropocentric.

Notwithstanding Alberta’s definition of environment and ecosystems, the Alberta government continues to regulate and manage human activities within ecosystems “component by component.” Different laws have been enacted to control how people use or pollute air, land, water, and biodiversity; how they extract gravel, minerals, and oil and gas; how they harvest forests and peat moss; how people operate intensive feedlots and hunt and fish; and so on. As well, there are different laws that control human activities on privately owned land and public land owned by the Province. Appendix A of this paper summarizes significant environmental laws applied in Alberta and identifies the regulated environmental component. In Appendix A, the complexity of Alberta’s environmental legal system is clearly illustrated.

Alberta’s complex environmental legal system is further complicated because the quantity and quality of environmental components may be regulated through completely different laws. For example, in Alberta, both surface water and groundwater quantity are regulated through the *Water Act*. If a landowner is entitled to divert and use 2,500 m³ of water per year, that amount can be withdrawn from a lake, a river, a creek, or a groundwater well in accordance with a license. The quantity can be measured and compliance with not withdrawing more than the upper limit can be enforced. However, if a landowner wants to divert and use 2,500 m³ of good quality drinking water, the law that regulates water quantity does not ensure that diverted water will be good enough quality for drinking.

Consistent with CEPA, Alberta’s EPEA controls how much of any contaminant known to negatively affect humans may be released into the water by any person(s) over time. The EPEA regulates water pollution; water treatment facilities; wastewater treatment and release facilities; and, incidentally, the development of groundwater wells. To summarize: the *Water Act* regulates human activities that may impact **water quantity**, while the EPEA regulates human activities that may impact **water quality**.

Regulated human activities with respect to any environmental component (including abiotic components such as coal and gravel deposits) can have significant impacts on the ecosystem as a

²⁷ CEPA, *supra* note 24, s 3(1).

²⁸ “Land-use Framework” (2008), online: *Government of Alberta* <https://landuse.alberta.ca/LandUse%20Documents/Land-use%20Framework%20-%202008-12.pdf> at 51 [LUF]. Accessed on August 10, 2021.

²⁹ *Alberta Land Stewardship Act*, SA 2009, c A-26.8 [ALSA].

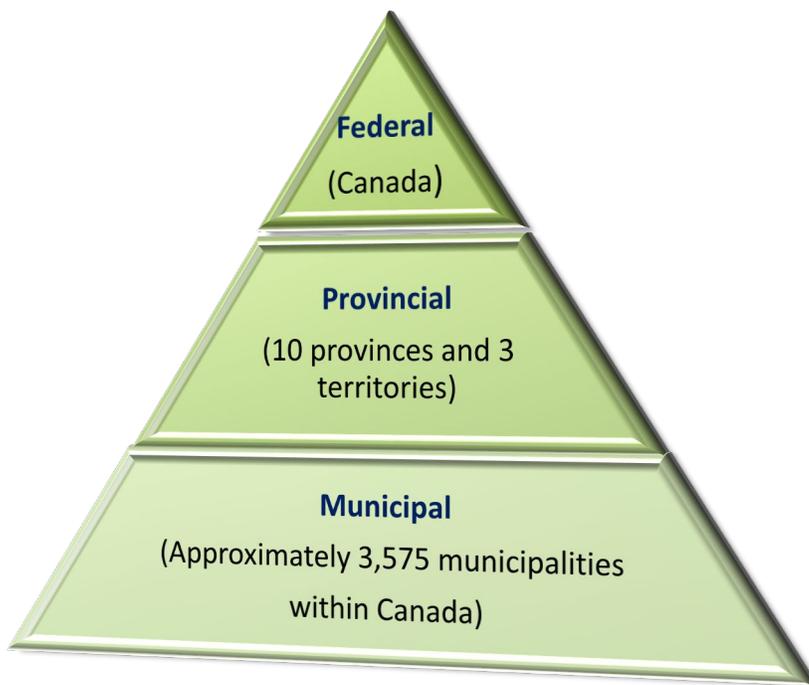
³⁰ LUF, *supra* note 28.

³¹ *Ibid.*

whole. As examples, an approved water use or water impoundment upstream in a watershed can impact approved water users many kilometers downstream while also destroying habitat necessary to sustain forests, fisheries, and many species of flora and fauna along the way. Approved gravel extraction operations can negatively impact land, air, water, biodiversity, and human settlements many miles from extraction sites, but are regulated on a site-by-site basis. These same human activities may have short and long term negative impacts on the ecosystem.

Over time, the ecosystem will adapt and evolve in response to these disturbances, however many ecosystem functions may be lost along with valued ecosystem services provided to humanity. Regulating human activities in any ecosystem must account for ecosystem dynamics from both the place of impact and the time of impact perspectives. The ecosystem does not stop changing, and old anthropocentric environmental laws may become obsolete given dramatic changes within ecosystems.

FIGURE 1: Hierarchy and landscape scale at which environmental laws are applied



Source: Judy Stewart. In Canada’s federalist system of government, provincial environmental laws must be consistent with federal environmental laws. Municipal bylaws that address environmental matters must be consistent with both federal and provincial enactments.

6. Natural regions and land use regions in Alberta

Key concepts to explore:

- Land use regions
- Natural regions
- Regional land use plans
- Seven major river basins

The study of human ecology and environment laws in Alberta becomes more complicated considering that the Province has six distinct *natural regions* and twenty sub-regions³² representing different ecological units. These have been characterized as Grassland, Parkland, Foothills, Boreal Forest, Rocky Mountains, and Canadian Shield. Each natural region (and sub-region) displays distinctive landscape patterns of vegetation, soils, and landform features. In Alberta, the Boreal Forest is the largest natural region, whereas the Canadian Shield is the smallest.³³ Each of these natural regions supports different populations of living organisms (including humans) and their complex interactions within the ecological unit.

The Alberta government implements the same environmental laws in all six natural regions without any differentiation. The critical connections between human land use, water use, and air pollution were not apparent in Alberta's environmental legal system throughout the 1900s and early 2000s. So-called integrated resource management is just now emerging in the form of regional land use plans to partially bridge the chasm between ecology and environmental law.³⁴

In the early-2000s, through the introduction of the LUF and the ALSA, the Province decided that human activities on the landscape were best regulated at the regional scale. Recognizing that water, land, air, and biodiversity interact and evolve at the watershed scale, Alberta's *seven major river basins*³⁵ became the regional geo-political units for implementing environmental laws. The intent of the ALSA was to put regional land use plans in place for the watersheds of the major river basins.

To date, only two regional land use plans have been enacted in Alberta: the *South Saskatchewan Regional Plan, 2014–2024* (SSRP)³⁶ and the *Lower Athabasca Regional Plan, 2012–2022* (LARP).³⁷ Each of these *regional land use plans* has associated surface water and air quality

³² “Natural Regions & Subregions of Alberta A Framework for Alberta’s Parks” (2005), online: *Government of Alberta* <https://albertaparks.ca/media/6256258/natural-regions-subregions-of-alberta-a-framework-for-albertas-parks-booklet.pdf>. Accessed on August 1, 2021.

³³ *Ibid.*

³⁴ See LUF, *supra* note 28; ALSA, *supra* note 29.

³⁵ *Water Act*, *supra* note 22.

³⁶ “South Saskatchewan Regional Plan 2014–2024” (amended May 2018), online: *Government of Alberta* <https://open.alberta.ca/dataset/13ccde6d-34c9-45e4-8c67-6a251225ad33/resource/e643d015-3e53-4950-99e6-beb49c71b368/download/south-saskatchewan-regional-plan-2014-2024-may-2018.pdf> [SSRP]. Accessed on September 2, 2021.

³⁷ “Lower Athabasca Regional Plan 2012–2022” (2012), online: *Government of Alberta* <https://landuse.alberta.ca/LandUse%20Documents/Lower%20Athabasca%20Regional%20Plan%202012-2022%20Approved%202012-08.pdf> [LARP]. Accessed on September 2, 2021.

management frameworks.³⁸ Biodiversity management frameworks for both regions are still in draft with no sign of release in 2022.

Alberta's natural regions and land use regions are not the same. Each land use region may contain two or more natural regions. For example, the SSRP land use region is a vast land mass and includes grassland, parkland, foothills, and Rocky Mountain natural regions. However, human activities that take place in these distinctive ecosystems in a natural region are very different simply because the variation in soils, vegetation, and landforms limit what people are able to do. Generally speaking, forestry and mineral extraction are common regulated activities in the Rocky Mountains and foothills, while regulated intensive livestock operations and oil and gas activities are common in the foothills, grasslands, and parkland regions.

Different human activities that occur more frequently within each of the land use regions need to be regulated differently within different ecological units if there are negative impacts to human health and property and to the ecosystem itself. For example, building houses and operating gravel pits in riparian landscapes within towns and cities may need to be regulated more than those same activities in uplands and unpopulated rural areas given the known effects of climate change and associated unpredictable severe weather events.

7. What are complex, dynamic social-ecological systems (SES)?

Key concepts and terms to explore:

- Emergent phenomena
- Environmental governance networks
- Social-ecological systems
- System
- System analysis

Introducing a Potential Environmental Law Game Changer:

The emergence of the federal *Impact Assessment Act* [IAA]³⁹ and the creation of the Impact Assessment Agency of Canada's⁴⁰ guidance document for proponents to use when assessing 'the extent to which a designated project contributes to sustainability,'⁴¹ may have profound effects on how Alberta's environmental legal system evolves in the future.

³⁸ See "Environmental Management Frameworks for the South Saskatchewan Region" (July 2014), online: *Government of Alberta* <https://open.alberta.ca/dataset/012b7c48-ada3-49d7-8de8-a378ef785078/resource/8c8ceb08-d138-417b-a7a7-3bd9ed3acb57/download/ssrp-environmentalmanagementfs-jul21-2014.pdf> [SSRP Frameworks].

Building on existing Alberta government environmental policy, legislation and regulation, frameworks provide regional context for the long-term management of existing activities and for future development. . . A management framework: • identifies desired regional objectives, • identifies key indicators and regional threshold values, including triggers and limits, • sets the foundation for ongoing monitoring, • requires evaluation and reporting on results, and • provides for communication of the results to Albertans.

Ibid.

³⁹ *Impact Assessment Act*, S.C. 2019, c. 28, s.1 [IAA].

⁴⁰ Government of Canada, 'Framework: Implementation of Sustainability Guidance,' (nd), online: <https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/guidance.html>. Accessed on November 15, 2021.

⁴¹ IAA, *supra* note 39, s. 22(1)(h).

For the first time in Canadian history, a federal law (the IAA) requires proponents to use system analysis of the ‘interconnectedness and interdependence of human-ecological systems’ when determining a designated project’s sustainability.

The Impact Assessment Agency of Canada’s ‘*Practitioner’s Guide re: sustainability* (Sustainability Practitioner’s Guide)⁴² arises from the requirement in section 22(1)(h) of the IAA to assess a designated project’s sustainability and is based on the federal government’s ‘Sustainability Principles,’ provided below.

These principles have been developed based on the definitions and concepts in the *Impact Assessment Act* and are informed by best practices, past environmental assessments and sustainability literature. The sustainability principles are:

Principle 1

Consider the interconnectedness and interdependence of human-ecological systems

Principle 2

Consider the well-being of present and future generations

Principle 3

Consider positive effects and reduce adverse effects of the designated project

Principle 4

Apply the precautionary principle and consider uncertainty and risk of irreversible harm⁴³

Sustainability Principle 1 is particularly innovative within the Canadian legal system for two reasons: first, it introduces proponents of designated projects under the IAA to *systems analysis*. Second, it acknowledges and requires an assessment of a designated project’s impact on the interconnectedness and interdependence of *social-ecological systems* (SES).

The Sustainability Practitioner’s Guide also provides a number of questions to help a proponent consider the designated project as part of a complex SES and identify the project’s critical system components. The responses to the queries help the proponent assess the sustainability of a designated project.

The Sustainability Practitioner’s Guide includes information adapted from Marta Pérez-Soba and Janet Dwyer’s presentation materials about the *Social-Ecological System Concept*. Both documents are accessible online and should be read as companion documents to this paper.

Marta Pérez-Soba (Wageningen Environmental Research) & Janet Dwyer (CCRI)The Social-Ecological System Concept, (nd), online: https://ec.europa.eu/information_society/newsroom/image/document/2017-1/3-4- socio-ecological_concept - marta_perez-soba_and_janet_dwyer_41127.pdf. Accessed on November 21, 2021.

⁴² Impact Assessment Agency of Canada, Practitioner’s Guide re: sustainability, <https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/guidance.html>. [Sustainability Practitioner’s Guide]. Accessed on November 15, 2021.

⁴³ *Ibid.*

To discover responses to the following questions requires multidisciplinary studies, monitoring and statistical data analysis, and system analysis.

- *What are key environmental, health, social and economic components that should be included in the system?*
- *What are the interactions between the environmental, health, social and economic components of the system?*
- *What are the potential pathways?*
- *What are the direct interactions?*
- *What are the indirect interactions?*
- *How are the systems impacted by cumulative effects?*
- *Has Indigenous knowledge informed the analysis?*
- *How do the interactions change over time?*
- *Will the system recover from disturbances?*
- *How will the system adapt to change caused by the designated project?*⁴⁴

A **system** is made up of two or more elements (components) interacting within an environment.⁴⁵ As certain components interact with one another in a system, new components may emerge from the interactions. **Emergent phenomena** contribute to and often drive adaptation and evolution of the system over time.⁴⁶ As a result, the emergent system is always more complex than any of the interacting components.

Human interactions in all of Alberta's natural regions have resulted in emergent phenomena. For example, ranches and hayfields, irrigation systems, cities and towns built in riparian lands along rivers, ski hills located in the mountains, recreational vehicle developments around freshwater lakes, and so on. Generally speaking, Alberta's environmental laws are reactionary to these emergent phenomena and the complex functions, interactions, and critical relationships among ecosystem components, including human activities that are having major negative impacts.⁴⁷

As elsewhere in the world, Alberta's complex, dynamic SES have emerged from human activities in ecosystems.⁴⁸ SES evolve when people interact and create institutions to control human activities in the ecosystem, for example, the allocation and use of water, land, or wildlife.

The concept of SES came about in the 1990s during studies in ecology, and dynamics within complex systems.⁴⁹ Throughout the 21st century, scholars with various theoretical perspectives

⁴⁴ Sustainability Practitioner's Guide, *supra* note 42.

⁴⁵ Ludwig Von Bertalanffy, "The History and Status of General Systems Theory" (1972) 15:4 *Academy of Management Journal* 407, online: <https://doi.org/10.5465/255139>. Accessed on July 1, 2020.

⁴⁶ Marina Alberti et al, "Integrating humans into ecology: opportunities and challenges for studying urban ecosystems" (2003) 53:12 *BioScience* 1169.

⁴⁷ Mary Ellen Tyler & Michael Quinn, "Identifying social-ecological couplings for regional sustainability in a rapidly urbanizing water-limited area of Western Canada" (2013) *Wessex Sustainable Development and Planning VI* 175 [Tyler & Quinn].

⁴⁸ Liu Jianguo et al, "Coupled human and natural systems" (2007) 36:8 *AMBIO: a journal of the human environment* 639.

⁴⁹ See F Berkes & C Folke, eds, *Linking social and ecological systems: management practices and social mechanisms for building resilience* (Cambridge, UK: Cambridge University Press, 1998) [Berkes & Folke]. Elsewhere, J Colding & S Barthel wrote:

working within different disciplines, such as adaptive management, resiliency, and sustainability, studied SES as emergent phenomena.⁵⁰

Within SES, social and ecological systems are inextricably connected, such that human social structures, culture, institutions (such as the economy), and the ecosystem co-evolve and co-adapt in response to feedback loops between and among them.⁵¹ For example, in the cases of irrigation of dry land in southern Alberta (*Irrigation Districts Act*)⁵² and intensive livestock operations (AOPA),⁵³ the government put special laws in place to address the complex governance systems that emerged to regulate and control these SES as they became larger in size with more and more infrastructure having impacts on society and the ecosystem.

A recent study by Colding and Barthel⁵⁴ found that research about SES is rapidly evolving. In 1998 there was only one publication by Berke and Folke⁵⁵ centered on human institutional arrangements for managing natural resources. However, by 2016 there were 2,165 publications exploring SES dynamics in a multitude of disciplines.⁵⁶ A quick Google Scholar search performed on June 23, 2021, looking for academic literature regarding ‘social ecological systems’ provided 3,440,000 results!

To date, despite volumes of academic studies and scientific research, no government has been successful in designing a legal system that can be implemented within SES where the consequences of implementing laws and regulations are known or certain.⁵⁷ Every law and

Almost five decades have passed since the notion of a social-ecological system (SES) first was coined. However, it was not until 20 years ago that the concept was turned into a framework for the study of intertwined human and natural systems. Since then the SES concept has been widely used in both the environmental and social sciences, as well as in economics, and in such diverse knowledge fields as medicine, psychology, and the arts and humanities. . . . Although Berkes and Folke were unaware of it at the time, the first definition of a social-ecological system was actually made by the Russian microbiologist B. L. Cherkasskii, who defined a social-ecological system as a system: . . . consisting of two interacting subsystems: the biological (epidemiological ecosystem) and the social (social and economic conditions of life of the society) subsystems where the biological subsystem plays the role of the governed object and the social acts as the internal regulator of these interactions. [(Original citations removed.)]

J Colding & S Barthel, “Exploring the social-ecological systems discourse 20 years later” (2019) 24:2 *Ecology and Society*, at 3 [Colding & Barthel]. See also BL Cherkasskii, “The system of the epidemic process” (1988)

32:3 *Journal of Hygiene Epidemiology Microbiology and Immunology* 321 at 321.

⁵⁰ Colding & Barthel, *supra* note 49 at 4-6 (Table 1).

⁵¹ Tyler & Quinn, *supra* note 47.

⁵² *Irrigation Districts Act*, RSA, 2000, c I-11 [IDA]. The previous legislation regarding irrigation in Alberta was much simpler and Irrigation District Boards were not considered to be corporations. The Boards did not have any authority (natural person powers) beyond what was provided in the IDA.

⁵³ AOPA, *supra* note 22.

⁵⁴ Colding & Barthel, *supra* note 49 at 2 (Figure 2).

⁵⁵ Berkes & Folke, *supra* note 49.

⁵⁶ Colding & Barthel, *supra* note 49.

⁵⁷ See Graeme S Cumming, David HM Cumming, & Charles L Redman, "Scale mismatches in social-ecological systems: causes, consequences, and solutions" (2006) 11:1 *Ecol Soc* [Cumming & Redman]. As stated in the abstract of this article:

Scale mismatches occur when the scale of environmental variation and the scale of social organization in which the responsibility for management resides are aligned in such a way that one or more functions of the social-ecological system are disrupted, inefficiencies occur, and/or important components of the system are lost. They are generated by a wide range of social, ecological, and linked social-ecological processes.

regulation results in unintended consequences, followed by new laws to try and solve emergent problems and so on.

There are also “[m]ismatches between the scales of ecological processes and the institutions that are responsible for managing them.”⁵⁸ These scale mismatches have not been reconciled within Alberta’s hierarchical environmental legal system.⁵⁹

Mismatches between the scales of ecological processes and the institutions that are responsible for managing them can contribute to a decrease in social-ecological resilience, including the mismanagement of natural resources and a decrease in human well-being. Solutions to scale mismatches usually require institutional changes at more than one hierarchical level. Long-term solutions to scale mismatch problems will depend on social learning and the development of flexible institutions that can adjust and reorganize in response to changes in ecosystems.⁶⁰

To date, flexible legal institutions that can rapidly adjust and reorganize in response to changes in ecosystems do not exist, although the provincial government claims to be striving toward “adaptive management.”⁶¹ The complexity of ecosystem dynamics means that human interactions within ecosystems cannot be governed by hierarchical governments through complex legal systems alone. Governance systems have evolved to address this problem.

Governing requires that interested stakeholders become involved in identifying problems they share in common and finding flexible solutions that everyone can live with. People need to be willing and capable of rapidly changing their embedded expectations derived from centuries-old social and cultural systems, as well as their human institutions and infrastructure in response to ecosystem changes.

This is not occurring in Alberta. If anything, people are holding fast or reverting to traditional practices even when scientific evidence is available suggesting that drastic changes are required. For example, the political response to the June 2013 floods in the Bow River Basin resulted in new legal provisions about land use in the floodway but regulations have still not been put in place. Notably, section 693.1 of the MGA⁶² authorizes the “Lieutenant Governor in Council to make regulations controlling, regulating or prohibiting any use or development of land that is located in a **floodway** within a municipal authority, including, without limitation, regulations specifying the types of developments that are authorized in a floodway.” Floodway is not defined in the MGA.

Without the regulations, some inappropriate land uses are still permitted in provincially mapped flood hazard areas and alluvial aquifers because these lands are not considered “water bodies” under the *Public Lands Act*.⁶³ For example, under the *Public Lands Act*, gravel extraction

Further research is needed to improve our ability to diagnose, understand, and resolve scale mismatches in linked social ecological systems.

Ibid. See also Ernstson et al, "Scale-Crossing Brokers and Network Governance of Urban Ecosystem Services: The Case of Stockholm" (2010) 15:4 Ecol Soc.

⁵⁸ *Ibid.*

⁵⁹ Cumming & Redman, *supra* note 57.

⁶⁰ *Ibid.*

⁶¹ See LUF, *supra* note 28; SSRP, *supra* note 29; SSRP Frameworks, *supra* note 38.

⁶² MGA, *supra* note 10, s 693.1(1).

⁶³ See *Public Lands Act*, *supra* note 22.

operations are not permitted in the “active channel”⁶⁴ of a surface water body, but the definition of “active channel” is not the same as a floodway, flood hazard area, or alluvial aquifer.

Major gaps or inconsistencies in Alberta’s environmental laws can create problems when citizens are working collaboratively in environmental governance networks trying to protect the ecosystem from negative impacts of human activities. Governing human activities in the ecosystem requires that everyone involved is “steering and guiding”⁶⁵ in the same direction as the ecosystem evolves over time.⁶⁶

8. Environmental governance is part of human ecology

Key concepts and terms to explore:

- Desired outcomes
- Environmental governance networks
- Environmental governance systems
- Governance system
- Governors
- Policies
- Social, political, regulatory, institutional and management subsystems of governance
- Structurally coupled subsystems of governance

Studies in human ecology include research into the evolution of *environmental governance systems* that emerge in response to resource scarcity.⁶⁷ An environmental governance system is a continually adapting and evolving social system made up of several key interacting and structurally coupled subcomponents.⁶⁸ Alberta’s environmental governance system includes *social, political, legal, institutional, and management subsystems*.⁶⁹ Each of these subsystems may also be broken down further into critical interacting components within the subsystem.⁷⁰

FIGURE 2: Critical Elements of an Environmental Governance System

⁶⁴ “Active channel” is defined in the *Code of Practice for Watercourse Crossings* as “those parts of the bed and banks of a water body that are without terrestrial vegetation” (“Code of Practice for Watercourse Crossings” (2019), online (pdf): *Government of Alberta* <https://www.qp.alberta.ca/documents/codes/CROSSING.PDF>, s 1(2)(a)). A floodway is defined as the “portion of the flood hazard area where flows are deepest, fastest and most destructive. The floodway typically includes the main channel of a stream and a portion of the adjacent overbank area. New development is typically discouraged in the floodway.” “Final Flood Studies and Maps,” online: *Government of Alberta* <https://www.alberta.ca/final-flood-maps.aspx>. Accessed on November 15, 2021.

⁶⁵ Gerry Stoker, “Governance as theory: five propositions” (1998) 50:155 *International Social Science Journal* at 17–18. See also Judy Stewart & Mary Ellen Tyler, “Understanding the Role of Environmental Governance Networks in Watershed Governance and Management” (2019) 229 *WIT Transactions on Ecology and the Environment* 33 [Stewart & Tyler].

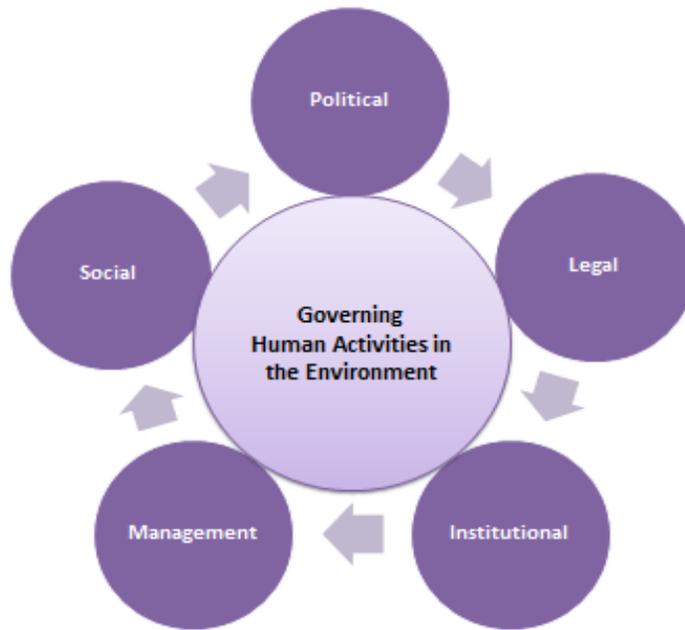
⁶⁶ See Stewart 2020, *supra* note 13.

⁶⁷ See Ostrom 1, *supra* note 14.

⁶⁸ See Stewart 2020, *supra* note 13.

⁶⁹ See *Ibid.* Also see Carmine Bianchi, Greta Nasi & William C Rivenbark, “Implementing collaborative governance: models, experiences, and challenges” (2021) 23:11 *Public Management Review* 1581, online (pdf): *Taylor & Francis Online* <https://www.tandfonline.com/doi/pdf/10.1080/14719037.2021.1878777?needAccess=true>. Accessed on August 12, 2021.

⁷⁰ See Stewart 2020, *supra* note 13.



Source: Judy Stewart: adapted from Stewart, 2020.

The subsystems of an environmental governance system are interconnected, and some subsystems are *structurally coupled*.⁷¹ This means that they are inextricably connected to one another and function within fluctuating and transitioning subsystem boundaries. For example, over time, policies formulated in the political subsystem become laws in the legal system, which, in turn, drive creation of institutional arrangements and new management approaches that affect society as a whole.⁷² The emergence of Alberta’s LUF and then ALSA provide good examples.

The complex interactions among actors (governors/stakeholders) within the inextricably connected social and political subsystems determine how the environmental governance system adapts and evolves over time.

In Alberta, some citizens may be members of *environmental governance networks*.⁷³ Environmental governance networks are emergent phenomena whereby government representatives and stakeholders within civil society voluntarily self-organize to manage human activities where environmental components such as air, land, water, and biodiversity are being depleted or negatively impacted by human activities.⁷⁴ Given their effectiveness in managing human activities collaboratively, these networks have become critical components of Alberta’s environmental governance system.⁷⁵

⁷¹ See Luhmann, *supra* note 8.

⁷² See Stewart 2020, *supra* note 13.

⁷³ See Stewart & Tyler, *supra* note 65.

⁷⁴ *Ibid.*

⁷⁵ See Amos A Hawley, *Human Ecology: A Theoretical Essay* (Chicago: University of Chicago Press, 1986).

In southern Alberta, the Bow River Basin Council⁷⁶ and Calgary Region Airshed Zone⁷⁷ are just two examples of provincially recognized environmental governance networks.⁷⁸ These voluntary organizations work with and alongside governments. They are composed of self-interested volunteers and have no legal decision-making authority or mandate.⁷⁹ Stakeholder adoption of any management plans they create to self-regulate human activities is also voluntary.

Regulation under the legal subsystem and the management subsystem refer to different social-political processes within an environmental governance system.⁸⁰ However, it is through the legal subsystem of governance that government authorities provide the framework for how the management subsystem will unfold over time, and how it will respond to regulatory shifts.

Management refers to “the activities of analysing and monitoring, and developing and implementing measures to keep the state of the environment within desirable bounds.”⁸¹ Management strategies are put in place by government administrative agencies and environmental governance networks to achieve *desired outcomes* as stated in policies, laws, and regulations. Managers do not determine the desired outcomes—they work with regulators and each other on strategies, programs, projects, and specific actions to achieve the outcomes once they have been identified by government lawmakers.⁸²

In Alberta, the management subsystem of environmental governance relies heavily on science and technology. Science helps regulators set standards and prescribe limits on substance release into the environment. Both federal and provincial standards are reflected in Alberta’s codes of practice and guidelines.⁸³ Scientifically established thresholds and triggers are monitored to manage human activities and interactions that reach thresholds and trigger management responses.

It is important to understand that the ecosystem itself is not being governed through Alberta’s environmental governance system. The ecosystem is an open, self-regulating system in its own right⁸⁴ that is adapting and evolving in response to ecosystem dynamics from both within and

⁷⁶ See “About the Bow River Basin Council”, online: *Bow River Basin Council* <https://www.brbc.ab.ca/about-us/about-the-brbc>. “The Bow River Basin Council (BRBC) is a collaborative and multi-stakeholder, charitable organization that is dedicated to conducting activities and programs that encourage and advance the enjoyment, learning, and protection of the waters of the Bow River Basin” (*ibid*). Accessed on November 16, 2021.

⁷⁷ See “Calgary Region Airshed Zone: About”, online: *Calgary Region Airshed Zone* <https://craz.ca/about>. Accessed on November 16, 2021. The mission of the Calgary Region Airshed Zone (CRAZ) is “[t]o monitor, analyse, and provide information on air quality and develop strategies to manage air quality issues within the Calgary Regional Airshed Zone” (*ibid*).

⁷⁸ Both BRBC and CRAZ are recognized as governance partners in the SSRP. See SSRP, *supra* note 36.

⁷⁹ See Stewart & Tyler, *supra* note 65.

⁸⁰ See *Ibid* (for an explanation on the differences between government, governance, and management).

⁸¹ *Ibid*. See also J.M. Kooiman et al, “Interactive Governance and Governability: An Introduction” (2008) 7:1 *The Journal of Transdisciplinary Environmental Studies* 1 at 3. “[G]overnance considers longer term trends and requirements with regard to natural resources, basing itself on an assessment of institutions and a discussion of the values to be attained. Policy deals with specific subjects in tighter time frames, whereas management grapples with the practical dimensions of its implementation” (*ibid*).

⁸² See Stewart 2020, *supra* note 13. See also the SSRP Frameworks, *supra* note 38.

⁸³ Stewart 2020, *supra* note 13.

⁸⁴ The *Canadian Law Dictionary* defines an ecosystem as a “dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit.” John A Yogis & Catherine Cotter, *Canadian Law Dictionary* (Hauppauge, New York: Barron’s Educational Series, 2008).

outside its boundaries. These dynamics include human environmental governance system processes, institutions, and technological interventions. However, society and the ecosystem are sometimes said to be co-adapting and co-evolving in response to feedback within structurally coupled SES.⁸⁵

Appendix A illustrates the complexity of the Alberta’s legal subsystem of environmental governance. However, to truly understand how environmental governance and environmental governance networks are working to protect ecosystems from harmful human activities, a citizen must come to understand that the political, institutional, and management subsystems of environmental governance also interact, adapt, and evolve over time. The values that people place on ecosystems become embedded in the laws that governments enact to manage human impacts on ecosystem dynamics and protect ecosystem function.

Unfortunately, in Alberta the environmental governance system is disorganized with different government department regulatory silos operating in isolation from one another.⁸⁶ While there are plenty of environmental laws, they are not well integrated, which creates gaps in how human activities in the environment are regulated and managed.⁸⁷ As a result, when citizens are making submissions at public hearings before provincial natural resource regulators or municipal land-use decision makers they may become confused about the regulators application (or non-application) of the hierarchy of laws. Citizens recognize regulatory gaps and loopholes that allow certain prohibited human activities to occur: for example, in-stream watering of cattle is prohibited but remains a common practice in rural Alberta.

9. Cumulative effects of human activities on Alberta’s ecosystems

Key concepts and terms to explore:

- Cumulative effects
- Cumulative effects management approach
- Human land uses
- Natural processes

What are *cumulative effects*? There are significant differences in how cumulative effects are defined and managed by different provincial governments in Canada. For example, in British Columbia, cumulative effects are defined as “changes to environmental, social and economic values caused by the combined effect of past, present and potential future human activities and natural processes.”⁸⁸

In Alberta, cumulative effects are defined as “the combined effects of past, present and foreseeable land use, over time, on the environment.”⁸⁹

⁸⁵ Tyler & Quinn, *supra* note 47.

⁸⁶ See Stewart 2020, *supra* note 13.

⁸⁷ See *ibid*. See also Stewart & Tyler, *supra* note 65.

⁸⁸ “Cumulative Effects Framework,” online: *Government of British Columbia* <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/cumulative-effects-framework>. Accessed on November 16, 2021.

⁸⁹ “Land and Resource Planning – Overview” online: *Government of Alberta* <https://www.alberta.ca/land-resource-planning-overview.aspx>. Accessed on November 16, 2021.

Alberta is focused on managing the cumulative effects of *human land uses* on the environment, without considering all the *natural processes* that may be occurring through ecosystem dynamics. In this way, the Alberta approach remains anthropocentric and does not reflect what is currently known about ecosystem functionality and ecosystem dynamics. BC's approach is more comprehensive because it considers the combined effects of all human activities *and* natural processes that are occurring notwithstanding any human activity.

Alberta describes its cumulative effects “management approach” as follows:

Cumulative effects management considers environmental, economic, and social (including cultural) factors in land-use decisions. The government follows a “plan-do-check” approach to setting, meeting and evaluating place-based outcomes. Having the best possible information to regularly assess performance allows us to change our approaches as necessary to ensure objectives are achieved. This is a cross-government effort and Alberta Environment and Parks has a leadership role on the environmental components. [(Emphasis added.)]⁹⁰

The Alberta government also explains that the SSRP and other regional land use plans reflect a *cumulative effects management approach* as follows:

Regional plans are developed and implemented using a cumulative effects management approach by setting and integrating the economic, environmental and social outcomes that Albertans want to achieve, and managing new and existing activities on the land to achieve these outcomes. This approach includes defining threshold values for identifying adverse impacts on the land base to determine appropriate management actions.

This direction is the foundation of the Land-use Framework, where the Government of Alberta is committed to manage the cumulative effects of development on air, water, land and biodiversity at the regional level. Cumulative effects management focuses on achievement of outcomes, understanding the effects of multiple development pressures (existing and new), assessment of risk, collaborative work with shared responsibility for action and improved integration of economic, environmental and social considerations. [(Emphasis in original.)]⁹¹

While the above quote illustrates an intent to integrate economic, environmental, and social outcomes and share responsibility for protecting the environment from human activities that may cause harm, the province has made little progress with integration of laws or with sharing responsibility for controlling human activities within ecosystems. For example, in 2020 the province amended the MGA and added that “fostering the well-being of the environment” was a purpose of municipal government.⁹² However, few legislative tools were provided through the MGA to help municipal councils understand how they might achieve this new purpose. Further, although municipal governments are largely responsible for land use on private lands in the settled

⁹⁰ *Ibid.*

⁹¹ “Cumulative Effects Management” online: *Government of Alberta* <https://landuse.alberta.ca/CumulativeEffects/CumulativeEffectsManagement/Pages/default.aspx>. See also “Cumulative Effects Management and Environmental Management Frameworks” (22 June 2021), online: *Government of Alberta* <https://www.alberta.ca/assets/documents/aep-cumulative-effects-management-and-environmental-management-frameworks.pdf>. Accessed on November 16, 2021.

⁹² MGA, *supra* note 10, s 3(a.1).

areas of Alberta,⁹³ they are not required to consider ecosystem dynamics or the cumulative effects of land use on the ecosystem when making land use decisions.

For example, through municipal area structure plans and land use decision-making, whole wetland complexes (prairie potholes and knob and kettle formations) have been removed from large parcels of land in Cochrane, Alberta⁹⁴ and replaced with human-made storm drainage ponds designed to a certain capacity. The designed capacity is based on modelling of pre-development and post-development run-off conditions and must reflect implementation of existing codes of practice.⁹⁵ These ponds are often clay-based and do not replace the wetland ecosystem that previously provided for groundwater infiltration and release during certain months of the year,⁹⁶ nor do they provide the habitat for the complex interacting biodiversity that frequented the wetlands. The storm drainage ponds have limited ecosystem functionality and may fail during unpredictable ecosystem dynamics that exceed design capacity. Additionally, they may become unsafe for recreation (ice skating and sledding) in the winter months due to sudden influx of warm runoff creating additional operational risks for municipalities.

When trying to participate effectively at public hearings and during public engagement, it can be a major hurdle for a citizen to understand the environmental legal subsystem and how harmful human activities may be approved when the laws and regulations are applied.⁹⁷ For example, in the case of storm drainage ponds replacing natural wetland complexes described above, regulators are not protecting the ecosystem from harm when they approve storm drainage ponds—they are protecting human health and private property from flooding because the ecosystem functionality has been destroyed. The unintended social and economic consequences of storm drainage ponds continue to emerge.

⁹³ See Stewart 2017, *supra* note 11.

⁹⁴ See Cochrane Environmental Action Committee, “When Two Worlds Collide” (15 February 2014), online: *YouTube* <https://www.youtube.com/watch?v=kydEvck8OdE>. Accessed October 2, 2021.

⁹⁵ See “Stormwater Management Guidelines for the Province of Alberta” (1999), online (pdf): *Government of Alberta* <https://open.alberta.ca/dataset/75b4611e-d962-4411-ac56-935ec2f8dcd1/resource/c6ccd70c-1a1e-4f2a-ae23-58e287ed5ada/download/stormwatermanagementguidelines-1999.pdf>. Accessed on October 4, 2021.

⁹⁶ *Ibid.*

⁹⁷ See Jason Unger, “A Guide to Public Participation in Environmental Decision-Making in Alberta” (2009), online: *CanLII* <https://canlii.ca/t/2ffv> [Unger]. Accessed on October 4, 2021.

10. How might understanding basic ecology and Alberta’s legal subsystem of environmental governance help citizens write effective submissions?

Key concepts and terms to explore:

- Directly affected
- Ecocentrism
- Legal processes
- Standing

Writing a submission to provincial regulators and municipal councils is often daunting for Albertans.⁹⁸ Having a basic understanding of ecology and Alberta’s legal subsystem of environmental governance may help citizens to frame what they want to present, especially at public hearings before municipal councils when they are enacting statutory planning documents and amending land use bylaw provisions.⁹⁹

Municipal public hearings are open to any person who the decision maker agrees to hear. However, in most provincially regulated processes, in order to meaningfully participate in decision-making processes through written or oral submissions, a citizen must be able to meet the requirements of *standing*.¹⁰⁰ There are many resources available to help citizens engage in these processes that explain when a citizen may have standing to participate.¹⁰¹ Issues of standing are outside the scope of this paper.

Some *legal processes* are written into Alberta’s environmental laws that provide opportunities for *directly affected*¹⁰² citizens to participate in appeals of decisions made by the Director who administers the *Water Act*, *EPEA*, and the *Public Lands Act*. *Affected*¹⁰³ citizens are authorized to appeal some municipal land use decisions.¹⁰⁴ However, to be considered directly affected, or affected, a citizen must be able to demonstrate how his or her land or personal property will be negatively impacted (harmed) by the human activity if approved. The ecosystem *per se* has no standing¹⁰⁵ to participate in regulatory appeals.

Having this basic knowledge is the first step to writing effective submissions because people will focus on the harm to themselves instead of just focusing on the harm to the ecosystem. Citizens must be able to make the connections between lost ecosystem function and the harm they will suffer if a regulated human activity is approved.

⁹⁸ See Judy Stewart, “A Citizen's Guide to Appearing Before Municipal Councils in Alberta” (2019), online: *CanLII* <https://canlii.ca/t/t2qy> [Stewart 2019]. Accessed on October 4, 2021.

⁹⁹ See MGA, *supra* note 10, Part 17

¹⁰⁰ See Environmental Law Centre of Alberta, “Standing in Environmental Matters” (2014), online: *CanLII* <https://canlii.ca/t/2ffx>. Accessed on October 4, 2021.

¹⁰¹ See *Ibid*.

¹⁰² See *Normtek Radiation Services Ltd v Alberta Environmental Appeal Board*, 2020 ABCA 456, online: *CanLII* <https://canlii.ca/t/hwghv>. Accessed on October 4, 2021.

¹⁰³ See *Re SDAB2013-0161*, 2013 CGYSDAB 161, online: *CanLII* <https://canlii.ca/t/gftc9>. Accessed on October 13, 2021.

¹⁰⁴ See Unger, *supra* note 97; Stewart 2019, *supra* note 98.

¹⁰⁵ See Christopher D Stone, *Should Trees Have Standing? Law, Morality, and the Environment* (Oxford: Oxford University Press, 2010).

Citizens might take an *ecocentrist* approach in their oral or written submissions. At least one scholar has gone so far as propose that environmental laws must reflect an ecocentrist rather than the traditional anthropocentric perspective if we want to address the cumulative effects and harm caused by human activities within ecosystems:

[E]cocentrism “accords nature ethical status at least equal to that of humans” because nature has its own intrinsic value. Environmental harm *per se* is based in the ethic of ecocentrism (sometimes referred to as “deep ecology” or “ecological egalitarianism”), which in environmental ethics, stands opposite to anthropocentrism. A pure ecocentric perspective in law treats natural objects as having their own rights. In this way, a wider range of polluting activity is captured as harmful because pure ecocentrism regards all damage to the environment as a violation of the environment’s rights, whereas anthropocentric harm only captures incidents of pollution that have adverse effects from the perspective of human beings.¹⁰⁶

In her recent article, Monique Evans describes the shift as follows:

Whereas anthropocentric harm only captures pollution that has some direct, adverse physical effect on human beings—or in some cases property—environmental harm *per se* encompasses damage to the natural environment that does not directly implicate people or property.

Environmental damage can be conceived of from an anthropocentric perspective. An anthropocentric perspective recognizes the value of the environment as a public resource that humans depend on for “health, recreation, material needs, and ultimately ... survival. The environment can be categorized as public property given that most aspects of the environment are public in nature: air, water, plant life, wildlife. But, “‘harm’ is a normative concept that reflects underlying social judgments about the good and the bad.” Death, illness, and physical injury to individuals, as well as some property damage, comfortably fall within current conceptions of anthropocentric harm. However, pollution in rivers and streams that has no direct effect on human health does not present itself so clearly as actionable harm from an anthropocentric perspective, where individual, human interests are of prime importance.¹⁰⁷

Taking an ecocentrist approach to writing a submission requires that citizens understand how human activities negatively affect ecosystem dynamics and lead to loss of ecosystem function that harms their health, well-being, or property. By working to protect human health and well-being, citizens may also be helping to sustain ecosystem function and prevent harmful ecosystem dynamics.

Unfortunately, common images of ecosystems (and watersheds for that matter) do not put human activities in the picture, so it is difficult to imagine how human activities are negatively affecting ecosystem dynamics or harming people. Below is a simplified four step process for

¹⁰⁶ Monique Evans, *supra* note 17 at 4. See also Lynda Collins & Heather McLeod-Kilmurray, *The Canadian Law of Toxic Torts* (Toronto: Canada Law Book, 2014) at ix (toxic tort litigation is litigation of “torts arising from environmental contamination or a toxic product”); Mark Wilde, *Civil Liability for Environmental Damage: Comparative Analysis of Policy in Europe and the US*, 2nd ed (The Netherlands: Kluwer Law International, 2013) at 11; David Hughes et al, *Environmental Law*, 4th ed (London, UK: Butterworths, 1996) at 135; Prue Taylor, *An Ecological Approach to International Law: Responding to Challenges of Climate Change* (London, UK: Routledge, 1998) at 167; and Susan F Mandiberg, “Locating the Environmental Harm in Environmental Crimes” (2009) 4 Utah L Rev 1177 at 1178–1179, 1187, 1196.

¹⁰⁷ *Ibid.*

using knowledge of basic ecology and Alberta's environmental legal subsystem of governance when making oral or written submissions. These steps will help citizens take an ecocentrist approach where the person and the person's property are visualized as components of a complex interacting ecosystem.

Step One: Put yourself in the ecosystem picture

The first step to writing an effective submission is to visualize the existing ecosystem at the geopolitical landscape scale where the proposed activity will take place. Instead of seeing yourself acting outside the ecosystem, picture yourself and your property, work, and family life as one living organism interacting within the ecosystem.

Visualizing the ecosystem in the context of your land and property as well as existing regulated and unregulated human activities will help you see the complexity and the impacts the proposed activity may have on the ecosystem as a whole. It will force you to look at the ecosystem as a functioning whole, where Alberta's environmental governance system is one small subcomponent of the ecosystem where you live, work, and play. This will take time and research, but it will help you frame what you may want to submit about the proposed human activity and how it will negatively affect (harm) you or your property. You will also be able to identify the cumulative effects of adding more potentially harmful human activities at that geopolitical landscape scale. This is the taking stock step to preparing your submission.

Step Two: Discover how the environmental legal system is supposed to protect you

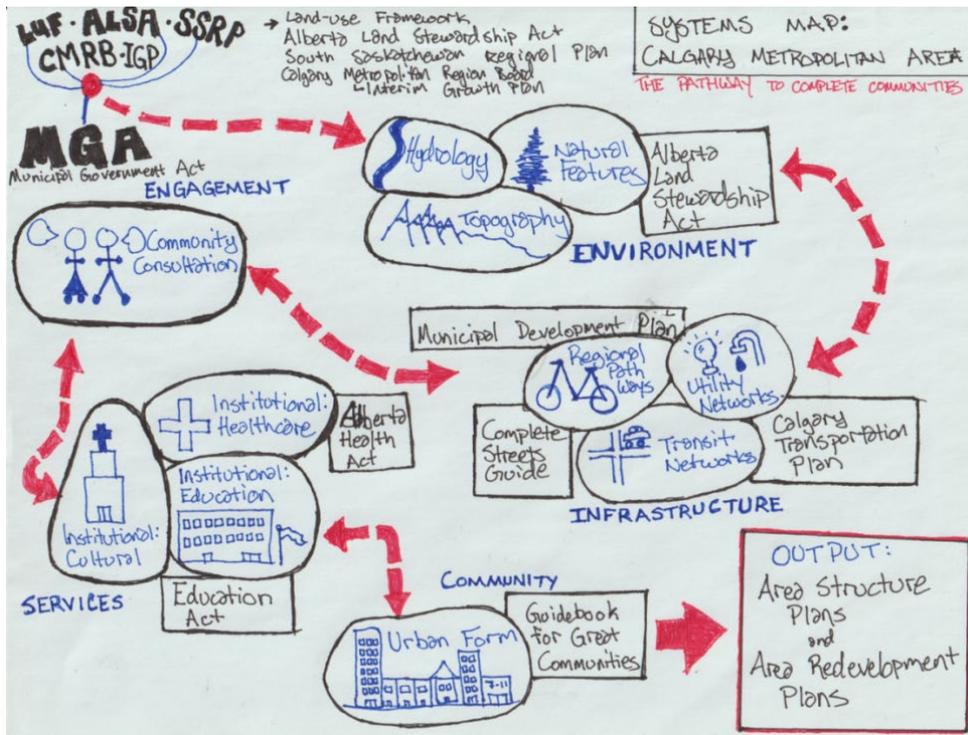
The second step is to find as much information as you can about the environmental legal system that regulates and controls human activities in the ecosystem at that geopolitical landscape scale. Understanding the laws, regulations, codes of practice, and guidelines in place to protect human health and wellness and property is critical. You will be able to illustrate how your health and wellness, or your property will be negatively affected if a proposed human activity is approved under the existing environmental legal system. This step is about applying what you know about ecology and environmental law to the proposal.

Figure 3 below illustrates a simple system map created to illustrate the connections between provincial environmental laws and municipal bylaws and statutory plans in the Calgary Metropolitan Area. The artist demonstrated how all the major interacting components in his 'human ecosystem' were connected and affecting each other at that landscape scale.

Step Three: Make the connection between lost ecosystem function and harm to you

This is the critical step and will demonstrate that you have an understanding of basic ecology and Alberta's environmental legal system. Identify how ecosystem function will be lost if the proposed human activity is approved. If ecosystem functionality is lost, how will your health and wellness and property be negatively impacted? Where is the harm? Is the harm immediate, or will it arise over the long term? Is the harm you identified arising in proximity to your property or is it upstream but will affect you in the long term? In this step, you may want to compile a series of photographs to help you explain the loss of ecosystem function and the harm you are trying to avoid.

FIGURE 3: Human Ecosystem within the Calgary Metropolitan Area



Source: Kevin Bailey, University of Calgary, Municipal Planning Law, 2020 (Used with permission.)

Step Four: Ask the regulator or decision maker to consider the harm identified

Identify the potential harm to you and your property as precisely as possible and use ecology terminology in your submission. Ask the regulator or decision maker to either refuse to approve the application or to ensure that terms and conditions are put in the licence, approval, or other authorization to ensure that the identified harm is avoided, minimized, or mitigated.

Terms and conditions may include requirements to monitor and publicly report on identified potential negative effects, such as dust and other airborne chemicals that cause respiratory illness, depletion or contamination of groundwater wells, pollution of surface water bodies, loss of indigenous species, increase in invasive species, erosion and sedimentation, pollution of the land by contaminated runoff, and so on.

A citizen’s oral or written submission to a provincial regulator or municipal decision maker does not need to be researched or written by an expert, but from time to time you may need expert advice. Generally, the more informative and convincing the submission, the more likely that the regulator or decision maker will take notice and ensure that any approval that is issued addresses identified potential harm to people.

As more citizens take an ecocentrist approach to writing their submissions, seeing themselves within the ecosystem, perhaps government officials will also try to prevent harmful ecosystem dynamics and loss of ecosystem function when avoiding, minimizing, or mitigating potential harms to human health and well-being.

11. Recommendations to improve regulatory approval processes and eventual decisions through enhanced understanding of ecosystems

The political subsystem of environmental governance is influenced by citizens who elect representatives to Parliament and the Alberta Legislature and participate in environmental governance. To improve Alberta's regulatory approval process and the eventual decisions made by provincial regulators and municipal decision makers requires that citizens work to increase:

- a) understanding about how human activities within the ecosystem may result in loss of ecosystem function;
- b) understanding ecosystem dynamics at the appropriate geopolitical scale; and
- c) political will to move toward an ecocentrist approach to regulatory decision-making.

Political will emerges because citizens participate in the environmental governance system and elect people to Parliament, the Alberta Legislature, and municipal councils who share the same ecological principles and values. However, political will does not happen overnight.

The following five recommendations are presented to help citizens frame oral and written submissions. The same recommendations are also directed to regulators and decision makers to enhance their own understanding of ecosystems and ecosystem dynamics while actively developing administrative policies that encourage active participation by citizens.

Recommendation 1: Actively Participate

Participate in public hearings and in regulatory processes whenever an opportunity arises. Force yourself to develop ecocentrist oral and written submissions—over time you will become proficient and effective when writing and talking about negative effects on human health and well-being, potential harms, ecosystems, ecosystem functions, and ecosystem dynamics. You will see yourself, your property, and your interactions in the ecosystem. You will see how protecting your health and well-being may also protect ecosystem functions that you rely upon in your daily life.

Recommendation 2: Educate and share

Educate yourself about ecology and the environmental legal system and share your knowledge with anyone who is interested. With modern technology, information about ecosystems is at the end of your fingertips. If you have a question about how any human activity may negatively affect people and property, you can ask the question on any search engine and hundreds of documents and images become instantly available. If you attend workshops and conferences about ecology and environmental legal systems, follow up with experts who may help you develop effective presentation materials on a specific topic.

Recommendation 3: Learn how to use free legal research tools and resources

Creating written submissions and presentation materials takes energy, time, and skill. You do not have to be a lawyer or hire a lawyer to have access to all of Alberta's environmental laws and learn how Alberta and Canadian courts interpret environmental laws and apply them in real life situations. There are several free legal research tools and plenty of online resources that citizens can access to help with preparations.

One of the most user-friendly and readily available legal research websites is **www.canlii.org**. Familiarize yourself with that search engine and practice finding laws, regulations, codes of

practice, guidelines, provincial policy documents, and court decisions where environmental laws were interpreted and applied. If you have specific legal questions, you can also request information from the Alberta Environmental Law Centre,¹⁰⁸ the Canadian Institute of Resources Law, and other legal research organizations where you live.

Recommendation 4: Focus on human activities that have the potential to harm to you and your property, and do not try to save the planet

Alberta’s environmental legal system is anthropocentric. Therefore, writing submissions that focus solely on negative effects to the components of the environment is largely a waste of time. Citizens must be able to demonstrate how they will be negatively affected by proposed human activities. The ecosystem is always adapting and evolving in response to human activities anyway. However, if you are able to protect your health, your well-being, and your property from harmful human activities, you may also be helping to sustain the ecosystem functions that sustain your quality of life.

Recommendation 5: Ask for monitoring and public reporting as conditions of approvals

Alberta’s evolving environmental management subsystem of governance relies on science and technology. Modeling what is already known to make predictions about where the ecosystem is heading over time is done regularly by scientists and experts. Analyzing models and the data collected through monitoring helps regulators and decision-makers to understand when human activities are triggering the need for increased management activities. These data sets may influence decisions to put a temporary or permanent moratorium on approvals of some human activities in certain ecosystems. Reporting of ecosystem dynamics and regime changes that affect all human activities in the ecosystem must be done publicly so that citizens also have access to the best science available.

Citizens might consider that there are significant amounts of publicly available reports analyzing monitoring data that are used by regulators and decision-makers. These reports can often be accessed through the websites of environmental governance networks in your community.

¹⁰⁸ “The Environmental Law Center: Our Story” online: *Environmental Law Center* <https://elc.ab.ca/who-we-are/our-story/>. Accessed on October 2, 2021.

12. Conclusion

Ecology and the study of ecosystems is an evolving biological science that requires multidisciplinary studies. Many Albertans do not have sufficient understanding of ecology or ecosystems to participate effectively in regulatory approval processes. This can make oral and written submissions at public hearings before provincial resource regulators and municipal land-use decision makers seem daunting and unproductive.

This citizen's guide fills a knowledge gap about the basics of ecology and how Alberta's environmental legal system attempts to regulate and control human activities within ecosystems. In doing so, it will hopefully help the general public participate more effectively in environmental policy development and government regulatory and decision-making processes.

Citizens who use this document may be able to see the critical connections between human activities and ecosystem dynamics and lost ecosystem function. People may also become catalysts for positive change in our regulatory approval system by encouraging regulators and decision makers to take an ecocentrist approach when reviewing applications for environmental licenses, approvals, and other authorizations.

By being well-informed and articulate about ecology and environmental law, citizens may help develop the political will to take a more ecocentrist approach to environmental governance throughout Alberta.

As a first step, the federal IAA process seems to be pointing proponents of designated activities under that legislation in the right direction, but it is too early to tell how well the Sustainability Practitioner's Guide will be utilized when assessing impacts.

Appendix A

Table 2: Significant Environmental Laws Applied in Alberta and the Regulated Component

Law	Regulated Component	Purpose of the Law	Institution/ Agency	Management Tools of Note
Federal				
<i>Canada Water Act, R.S.C., 1985, c. C-11.</i>	Water	to provide for management of Canadian water, including research and the planning and implementation of programs relating to the conservation, development and utilization of water resources	Environment and Climate Change Canada (ECCC)	Flood reduction program Master Agreement on Apportionment
<i>Fisheries Act, RSC 1985, c. F-14.</i>	Biodiversity Water Habitat	to provide a framework for (a) the proper management and control of fisheries; and (b) the conservation and protection of fish and fish habitat, including by preventing pollution.	Department of Fisheries Oceans and Coastal Waters (DFO)	<i>Alberta Fisheries Regulations, 1998 SOR/98-246</i>
<i>Species at Risk Act SC 2002, c. 29.</i>	Biodiversity Habitat	to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened.	COSEWIC means the Committee on the Status of Endangered Wildlife in Canada: s.14 of the Act.	COSEWIC) Order, SI/2019-13 Critical habitat identified for each species.
<i>Migratory Birds Convention Act 1994, SC 1994, c. 22.</i>	Biodiversity Habitat	to implement the Convention by protecting and conserving migratory birds — as populations and individual birds — and their nests.	Minister of Environment (ECCC)	Federal and provincial wetland policies
<i>Canadian Navigable Waters Act RSC 1985, c N-22.</i>	Water	to protect navigation in Canadian navigable waters	Minister of Transport	Development referrals to ensure that navigability is not impaired.
<i>Canadian Environmental Protection Act, 1999 S.C.1999, c. 33.</i>	All components	to prevent pollution and the protect the environment and human health in order to contribute to sustainable development	Federal and provincial representatives on committee (ECCC)	Collaborative processes to prevent pollution
<i>Impact Assessment Act S.C. 2019, c. 28.</i>	All components (Human ecology is a critical aspect)	to protect the components of the environment, and the health, social and economic conditions that are within the legislative authority of Parliament from adverse effects caused by a designated project	Minister of the Environment (ECCC)	s.22(1)(h) requirement to assess project's sustainability following four principles Assessment of project sustainability uses system analysis

Law	Regulated Component	Purpose of the Law	Institution/ Agency	Management Tools of Note
<i>Pest Control Products Act, S.C. 2002, c. 28</i>	All components	to protect human health and safety and the environment by regulating products used for the control of pests	Minister of Health and advisory panels	Farm plans and best management practices to control pests
<i>Transportation of Dangerous Goods Act S.C. 1992, c. 34.</i>	All components	to promote public safety in the transportation of dangerous goods	Minister of Transport	Setbacks for storage and transportation and use of dangerous goods
Provincial				
<i>Water Act, RSA 2000, c. W-3.</i>	Water	to support and promote the conservation and management of water, including the wise allocation and use of water Regulates water diversion and use through licenses Regulates activities that disturb water through approvals	Alberta Environment and Parks (AEP) Alberta Environmental Appeals Board	<i>Water For Life: Alberta's Strategy for Sustainability.</i> Codes of Practice; such as <i>Code of Practice for Watercourse Crossings.</i>
<i>Environmental Protection and Enhancement Act RSA 2000, c. E-12.</i>	All components	to support and promote the protection, enhancement and wise use of the environment Regulates designated activities and substance release that may pollute through approvals	AEP	Approvals Regulations such as <i>Wastewater and Storm Drainage Regulation</i> Codes of Practice such as <i>Code of Practice for Pits.</i>
<i>Public Lands Act, RSA 2000, c.P-40.</i>	Land (Public lands including the beds and shores of water bodies)	To control use and allocation of public land in Alberta. S.3 – the province owns the beds and shores of most naturally occurring water bodies in Alberta.	AEP Lands Division	Public land use zones Recreation areas and trails on public lands.
<i>Agricultural Operations Practices Act, RSA 2000, c.A-7.</i>	Land	Regulates agricultural operations, such as intensive livestock operations.	Natural Resources Conservation Board	Approvals, registrations and reviews. <i>Standards and Administration Regulation, Alta Reg 267/2001</i>
<i>Irrigation Districts Act, RSA, 2000, c. I-11,</i>	Water Land	to provide for the formation, dissolution and governance of irrigation districts in order that the management and delivery of water in the districts occur in an efficient manner providing for needs of users.	Irrigation Districts	Water conservation efficiency and productivity plans Technological advances
<i>Forests Act, RSA 2000 c.F-22.</i>	Biodiversity	Regulates and manages timber harvesting operations on public lands	AEP Forest Officers	Regulations require forest management agreements

Law	Regulated Component	Purpose of the Law	Institution/ Agency	Management Tools of Note
<i>Provincial Parks Act, RSA 2000, c.P-35.</i>	Land	Parks are established, and are to be maintained, (a) for the preservation of Alberta's natural heritage, b) for the conservation and management of flora and fauna, (c) for the preservation of specified areas, landscapes and natural features and objects in them that are of geological, cultural, historical, archeological, anthropological, paleontological, ethnological, ecological or other scientific interest or importance, (d) to facilitate their use and enjoyment for outdoor recreation, education and the appreciation and experiencing of Alberta's natural heritage, and (e) to ensure their lasting protection for the benefit of present and future generations.	AEP Conservation officers	Permits are required to access parks and campgrounds.
<i>Wildlife Act RSA 2000, c. W-10.</i>	Biodiversity	Regulates and manages wildlife, wildlife habitat, hunting and export of wildlife.	Director of Fish and Wildlife Fish and Wildlife Officers Conservation officers	Aligns with the <i>Migratory Birds Convention Act</i> Fish and Wildlife Fund used to conserve fish and wildlife habitat. Licenses and permits required to hunt wildlife.
<i>Weed Control Act, SA 2008, c W-5.1.</i>	Biodiversity	Regulates noxious and prohibited noxious weeds on private land, including riparian land Municipalities administer the law on municipal and privately-owned lands	AEP Municipal weed inspectors Municipal bylaw enforcement officers	Municipal nuisance bylaws Municipal weed control bylaws
<i>Fisheries (Alberta) Act, RSA 2000, c. F-16.</i>	Water Biodiversity	Regulates fishing and protection of fish habitat in Alberta in alignment with federal law.	AEP Fish and Wildlife Officers	Administers and aligns with federal <i>Fisheries Act</i> Protects fish habitat and fisheries Restricts human activities that may harm fish and fisheries

Law	Regulated Component	Purpose of the Law	Institution/ Agency	Management Tools of Note
<i>Alberta Land Stewardship Act, SA 2009, c A-26.8</i>	All components	(a) to provide a means by which the Government can give direction and provide leadership in identifying the objectives of the Province of Alberta, including economic, environmental and social objectives; (b) to provide a means to plan for the future, recognizing the need to manage activity to meet the reasonably foreseeable needs of current and future generations of Albertans, including aboriginal peoples; (c) to provide for the co-ordination of decisions by decision-makers concerning land, species, human settlement, natural resources and the environment; (d) to create legislation and policy that enable sustainable development by taking account of and responding to the cumulative effect of human endeavour and other events.	Land Use Secretariat Directors under <i>Water Act</i> , EPEA and <i>Public Lands Act</i> Municipal councillors and land-use development authorities	Regional land-use plan regulations: LARP and SSRP and management frameworks. Provides guidance and expectations that provincial and municipal decision-makers will protect components of the environment during land-use development.
<i>Municipal Government Act, RSA 2000, c.M-26.</i>	Land (Privately owned)	Regulates municipalities and most land-use planning and development on municipal and privately owned lands	Department of Municipal Affairs Municipal councils Development authorities Subdivision/ Development Appeal Boards Municipal Government Board	Statutory planning documents Land use bylaws Section 7 Health and Welfare Bylaws Section 60 – management of water bodies Storm Drainage Master Plans
<i>Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act, RSA 2000, c W-9.</i>	Land Biodiversity	to protect and manage certain areas of Alberta for the purposes of preserving their natural beauty and safeguarding them from impairment and industrial development; to establish certain kinds of areas and reserves and to provide varying degrees of protection to those areas and reserves; and to establish certain lands as heritage rangelands in order to protect their grassland ecology.	AEP Conservation officers	Management plans Some human uses prohibited. Permits, licences, approvals, authorizations, consents may be issued to users.