

Article

Forest Landscape Restoration Legislation and Policy: A Canadian Perspective

Nicolas Mansuy ^{1,*}, Hyejin Hwang ², Ritikaa Gupta ³, Christa Mooney ³, Barbara Kishchuk ⁴ and Eric Higgs ⁵

¹ Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, 5320 122 Street, Edmonton, AB T6H 3S5, Canada

² Environment and Climate Change Canada, 351, boul. Saint-Joseph, Gatineau, QC K1A 0H3, Canada

³ Natural Resources Canada, Canadian Forest Service, Ottawa, ON K1A 0E4, Canada

⁴ Science Consultation Services, Johnson Shoyama Graduate School of Public Policy, Regina, SK S7N 5B8, Canada

⁵ School of Environmental Studies, University of Victoria, David Turpin Building, B243, Victoria, BC V8P 5C2, Canada

* Correspondence: nicolas.mansuy@canada.ca; Tel.: +1-587-334-5611

Citation: Mansuy, N.; Hwang, H.; Gupta, R.; Mooney, C.; Kishchuk, B.; Higgs, E. Forest Landscape Restoration Legislation and Policy: A Canadian Perspective. *Land* **2022**, *11*, 1747. <https://doi.org/10.3390/land11101747>

Academic Editors: Jorge Mongil-Manso, Joaquín Navarro Hevia and Ilan Stavi

Received: 19 August 2022

Accepted: 26 September 2022

Published: 9 October 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: Restoring degraded ecosystems is an urgent policy priority to regain ecological integrity, advance sustainable land use management, and mitigate climate change. This study examined current legislation and policies supporting forest landscape restoration (FLR) in Canada to assess its capacity to advance restoration planning and efforts. First, a literature review was performed to assess the policy dimension of FLR globally and across Canada. Then, a Canada-wide policy scan using national databases was conducted. While published research on ecological restoration has increased exponentially in Canada and globally since the early 1990s, our results showed that the policy dimensions of FLR remain largely under documented in the scientific literature, despite their key role in implementing effective restoration measures on the ground. Our analyses have identified over 200 policy instruments and show that Canada has developed science-based FLR policies and best practices driven by five main types of land use and extraction activities: (1) mining and oil and gas activities; (2) sustainable forest management; (3) environmental impact assessment; (4) protected areas and parks; and (5) protection and conservation of species at risk. Moreover, FLR policies have been recently added to the national climate change mitigation agenda as part of the nature-based solutions and the net-zero emission strategy. Although a pioneer in restoration, we argue that Canada can take a more targeted and proactive approach in advancing its restoration agenda in order to cope with a changing climate and increased societal demands for ecosystem services and Indigenous rights. Considering the multifunctional values of the landscape, the science–policy interface is critical to transform policy aspirations into realizable and quantifiable targets in conjunction with other land-use objectives and values.

Keywords: climate change; cumulative effects; ecological restoration; Indigenous Peoples; nature-based solutions; novel ecosystem

1. Introduction

Land degradation—defined as a persistent loss of ecosystem services and ecological integrity—is escalating globally. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reported that degradation of the Earth's lands and waters through human activities is negatively impacting the well-being of at least 3.2 billion people and costing more than 10% of the global annual gross domestic product (GDP) through loss of biodiversity and ecosystem services [1]. Ecosystem degradation is also a major contributor to climate change, with deforestation alone contributing about 10% of all human-induced greenhouse gas emissions [2].

Restoring degraded ecosystems has become an urgent policy priority. Avoiding and reducing ecosystem degradation is now inscribed on many global initiatives such as the UN-Reducing Emissions from Deforestation and Forest Degradation (REDD), the UN-Convention to Combat Desertification (UNCCD), the Convention on Biological Diversity (CBD), the United Nations' Sustainable Development Goals (SDGs), and the Bonn Challenge—a global initiative to restore 350 Mha of deforested and degraded land by 2030. In 2021, the United Nations Decade on Ecosystem Restoration was launched with the objective to scale up and mainstream the various restoration programs and initiatives [3].

In recent years, the concept of ecological restoration has advanced significantly both as a scientific discipline and as a practical approach to support sustainable land use and adaptive land management [4,5]. An example of this evolution is the development of forest and landscape restoration (FLR) practices, which aim to provide principles for the management of multi-functional landscapes, where forestry, agriculture, and mining can be juxtaposed with other land uses such as recreation and conservation [6,7]. FLR exists as a type of restoration practice, but tends to offer more flexibility and multifunctionality than ecological restoration, as described by the Society for Ecological Restoration (SER) [8]. Considering its multiple benefits, FLR is described as a nature-based solution (NBS), which can help to address global societal crises such as biodiversity loss, climate change, natural disasters, and food and water security [9].

Canada was the first country in the world to develop a national policy framework for restoration of protected areas [10], forming the basis for the first global guidelines on restoration [11]. However, with the pace of cumulative effects accelerating, assessing the capacity of the regulation framework that governs restoration policies is paramount to safeguarding the natural capital of Canada. Examining the policy instruments that could support an FLR agenda in Canada is also crucial to establish goals and key measures required to meet international commitments toward restoration, climate change, protected areas, and biodiversity [12].

Accounting for up to 40% of 979 Mha total land, Canadian forest landscapes are a global natural capital legacy. Canada contains 30% of the world's boreal forest, 9% of the world's overall forest area, and 20% of the world's freshwater resources, including peatlands acting as some of the largest carbon pools in the world [13]. Canada's economic wealth is strongly rooted in the extraction and export of its natural resources and represents, therefore, an opportunity to assess the importance of environmental policies supporting FLR activities. As one of the largest natural resources sectors in the world [14], the forestry, mining and energy sectors are major industries operating on forested landscapes, together contributing over 10% of Canada's GDP [15]. Management of natural resources is the responsibility of Canada's provinces and territories (P&Ts), and implementation of strong environmental policies is key to ensuring healthy and resilient ecosystems as well as a competitive natural resources sector.

Increasing global demand for natural resource commodities has also brought increased attention to Canada's environmental policies on the international scene, including protection of species at risk, environmental performance of the energy sector, efforts to achieve international sustainability targets, and building relationships with Indigenous Peoples [16–18]. Despite the declining trend in deforestation in Canada (Appendix A: Figure A1), the cumulative effects of anthropogenic and natural disturbances in space and time can impede the sustainable management of natural resources and the ability to maintain biodiversity, environmental, social, and cultural values of the landscapes [19,20]. Furthermore, forest regions across Canada are already experiencing the impacts of climate change, resulting in altered vegetation, ecosystem services, biodiversity, carbon cycles, and natural disturbance regimes (e.g., fire and pests) [21,22]. In addition, Indigenous populations are increasingly impacted by climatic change given their close relationship with the environment and their reliance on the land for their well-being and health [23]. There-

fore, natural and anthropogenic disturbances in Canada are intermingling in the landscape and there is a broad agreement that mitigation and reversing measures are essential to prevent further damage to the health of ecosystems and peoples [24–27].

This paper reviews and examines current legislations and policies supporting FLR at the P&Ts and federal levels to assess Canada's capacity to accelerate restoration planning and efforts. First, a literature review was completed to assess the policy dimension of FLR found in scientific publications and compare trends at the global and national levels. Then, a Canada-wide legislation and policy scan was conducted using national and governmental databases.

2. Terminology and Methodology

Ecological restoration is a relatively young discipline and in constant evolution, hence the evolving terminology [28]. The Society for Ecological Restoration, the leading global network of professionals in this field today, defines ecological restoration as *“the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed”* [8]. We adopt a broad view of restoration as encompassing to greater and lesser extents a wide variety of environmental practices that also vary from region to region. Therefore, various terms were used in the publication search in order to capture this variability. For example, the search for restoration-related policies included keywords such as (1) mitigation, restoration, recovery, reclamation, remedy, and rehabilitation in the context of environmental assessment and mining; (2) protection and conservation in terms of wildlife habitat and protected areas; and (3) renewal, reforestation, and afforestation as part of sustainable management of forests. Because we were interested in FLR in the context of sustainable land use management, the research was focused on terrestrial forested ecosystems as opposed to marine and coastal ecosystems.

First, a broad quantitative literature review was performed to assess the extent of the policy representation in ecological restoration scientific publications at the national and global levels. The number of scientific papers published was assessed in the Web of Science Core Collection General from 1990 to 2021 with search terms used including the following: (1) (restoration OR restored OR reclamation OR reclaim) AND (ecosystem * OR ecol *); (2) (restoration OR restored OR reclamation OR reclaim) AND (ecosystem * OR ecol *) AND (forest * OR woodland OR terrestrial); (3) (policy OR legislat * OR law) AND (forest * OR land *) AND (restored OR restoration OR reclamation OR reclaim); (4) (“forest governance” OR “land * governance”); and (5) (“forest landscape restoration”) in title, abstract, and keyword fields. In a literature database search, a search term ending with an asterisk (*) returns results with topics including the search term before the asterisk and the possible extension of the term. For example, “ecol *” used in this paper returned publications containing keywords like ecology and ecological. In addition, search terms in quotation marks return results that contain the entire query in the quotation marks. To extract publications in the context of Canada from the search results, an extra search term, AND (Canada *), was added to each combination of search terms.

Secondly, a Canada-wide scan was conducted using a variety of sources including Canadian Legal Information Institute, Canada's Justice Laws website, and other relevant federal and provincial/territorial government websites. The Canadian Legal Information Institute is the primary source of Canadian law, both legislative and judicial, from federal to provincial/territorial jurisdictions, offering free public access to more than 2.4 million documents across more than 300 databases. For the purpose of our study, public policy was interpreted as *“a set of decisions by governments and other political actors to influence, change, or frame a problem or issue that has been recognized as in the political realm by policy makers and/or the wider public”* [29]. Multiple levels of public policy and legislation were thus assessed in this paper and their definitions are as follows: *Act*, also called a statute, is a law passed by the provincial or federal legislature. *Regulation*, also called delegated legislation, is a law made by the government, not the legislature, to provide details to give effect to the policy. Additionally, guidelines, standards, frameworks, and best practices

pertaining to FLR were explored and evaluated. Guidelines, standards, or frameworks, while there is no force of law, are documents that interpret legislation and/or regulation and provide technical specifications and requirements to advise how to comply with them. Although fundamentally different in their objectives and application, legislations and policies have been addressed together in this study because legal obligations for restoration are just as important as practical guidelines to ensure that restoration activities are implemented and monitored using the best available science [30]. It is important to emphasize that this study does not pretend to be exhaustive and to examine each policy in detail, but rather to provide an overview of the policy dimension of FLR in Canada and, above all, to identify the most important gaps and pathways to implement effective restoration actions.

3. Results

3.1. Publication Trends in Ecological Restoration

Globally, published research on ecological restoration has increased exponentially over time since the restoration movement was initiated in the early 1990s, right after the formation of the SER in 1989. This trend has been even more pronounced since 2000 as the number of publications increased more than 17-fold from 250 papers in 2000 to 4279 in 2021 (Figure 1a). Ecological restoration studies specific to forest, woodland, or terrestrial ecosystems showed a steady increase around the globe. On the other hand, restoration-policy-related research remained largely under-documented, as the number of publications on this topic was about 11% of the annual publications on ecological restoration during the search period (1990 to 2021). The number of publications on forest governance research was at around 4% of the annual number of ecological restoration literature; however, there was a notable increase over the last decade from an average of 13 publications over a 10-year period between 2002 and 2011 to 102.8 publications between 2012 and 2021. The term “FLR” started to be mentioned in scientific publications around 2007 and has gained more interest during the last decade, yet the number of publications is very low.

In Canada, similar publication trends were observed at a relatively lower volume than global trends with a major increase in publications pertaining to ecological restoration and terrestrial ecosystem restoration after 2014 (Figure 1b). Policy research related to FLR was still in its infancy in Canada during the 1990s and 2000s as the average number of publications was 1 and 2.2, respectively, during those periods. This research topic gained more attention over the last decade with an average of 4.2 papers published between 2010 and 2021, which was about 10% of the ecological restoration literature in Canada. The term “governance” in the context of forest and landscape only started to emerge in the literature since 2010 in Canada and the governance-related publications between 2010 and 2021 were about 5% of the number of publications on ecological restoration.

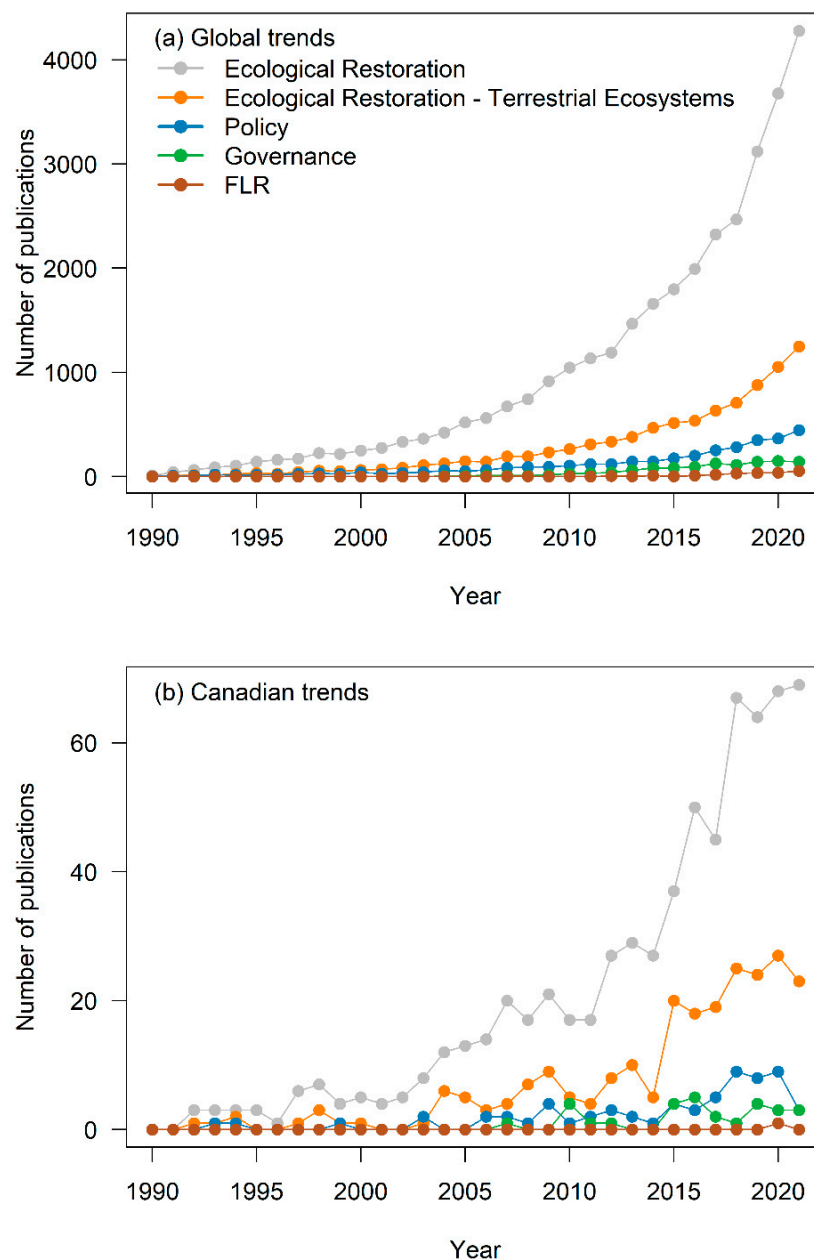


Figure 1. Publication trends in ecological restoration in the world (a) and Canada (b) between 1990 and 2021 as found in the Web of Science. Search terms for ecological restoration were (*restoration OR restored OR reclamation OR reclaim*) AND (*ecosystem * OR ecol **); for terrestrial ecosystems, an additional search term, AND (*forest * OR woodland OR terrestrial*), was added. Terms for policy were (*policy OR legislat * OR law*) AND (*forest * OR land **) AND (*restored OR restoration OR reclamation OR reclaim*); for governance, ("*forest governance*" OR "*land * governance*"); and for FLR, ("*forest landscape restoration*"). Canadian trends were extracted from each search conducted at the international level by including AND (*Canada **) at the end of the search terms.

3.2. Forest Landscape Restoration Related Policies at the Federal, Provincial, and Territorial Levels

We identified almost 200 policy instruments supporting FLR directly and/or indirectly at the federal and P&T levels in the form of *Acts* (Table 1, Appendix B) as well as in the form of guidelines, standards, frameworks, and best management practices (Table 2, Appendix C). Specifically, our results show that FLR is mandated and supported under

five types of land use and resource extraction activities: (1) mining and oil and gas activities; (2) sustainable forest management; (3) environmental impact assessment; (4) conservation and restoration of ecosystem integrity in protected areas and parks; and (5) protection and conservation of species at risk and their habitats. In addition, FLR policies were recently added to the national climate change mitigation agenda as part of the nature-based solutions program and the net-zero emission strategy [31,32]. We have also noted that these technical documents are often developed in collaboration with multi-jurisdictional working groups (government, academia, NGOs, industries) and hands-on restoration practitioners. The policy instruments are listed in Tables 1 and 2 and in Table A1 and A2 in the appendix by purpose and by jurisdiction. The context of their application is described as follows.

Table 1. List of provincial, territorial, and federal acts mandating restoration, rehabilitation, reclamation, and remediation activities categorized by attributes and jurisdictions. See Appendix B: Table A1 for more details.

	Mining, Oil, and Gas	Sustainable Forest Management	Environmental Impact Assessment and Protection	Protected Areas	Wildlife Habitat
Provincial and territorial					
British Columbia	1, 2	3, 4	5, 6	7, 8, 9, 10	11
Alberta	See Table 3	12, 13	14	15, 16	17
Saskatchewan	18	19	20, 21	22, 23	24
Manitoba	25, 26	27	28, 29	30	31, 32
Ontario	33	34, 35	36, 37	38	39, 40
Québec	41	42	43	44, 45	46
New Brunswick	47	48	49	50, 51	
Nova Scotia	52	53, 54	55	56	57
Prince Edward Island	58	59	60	61	62
Newfoundland and Labrador	63, 64	65	66	67	68
Northwest Territories	69	70	71	72	73
Yukon	74	75	76	77	78
Nunavut		79	80		81
Federal	82	83	84, 85, 86, 87, 88	89	90, 91

Table 2. Provincial, territorial, and federal guidelines, standards, framework, or best management practices supporting restoration, rehabilitation, reclamation, and remediation activities categorized by attributes and jurisdictions supporting categorized by attributes and jurisdictions. See Appendix C: Table A2 for more details.

	Reclamation and Restoration	Environmental Impact Assessment and Protection	Sustainable Forest Management	Climate Change
Provincial and territorial				
British Columbia	92, 93, 94, 95, 96	97, 98, 99	100, 101	102
Alberta	103, 104, 105, 106, 107, 108	109	110, 111	112
Saskatchewan	113, 114, 115, 116, 117	118	119	120
Manitoba	121, 122	123	124	125
Ontario	126, 127, 128	129, 130	131, 132, 133, 134	135
Québec	136	137	138, 139	140
New Brunswick	141	142	143	144
Nova Scotia	145	146, 147	148, 149, 150	151

Prince Edward Island		152	153	154
Newfoundland and Labrador	155	156	157	158
Northwest Territories	159, 160, 161	162, 163	164	165
Yukon	166	167, 168	169	170
Nunavut	171, 172	173		174
Federal	175	176	177, 178, 179	180, 181, 182, 183, 184, 185

3.2.1. Mining, Oil, and Gas Activities

Mitigation of disturbed landscapes following oil, gas, and mining activities is a major driver of restoration and reclamation policies across Canada, especially in the provinces of Alberta, British Columbia, and Saskatchewan (Tables 1 and 2). In the context of mining, oil, and gas activities, restoration and reclamation are used interchangeably to describe the activities related to the removal and decontamination of materials, decommissioning of structures, and reconstruction of the disturbed land through revegetation. We have identified multiple policies mandating restoration and reclamation following mining, oil, and gas activities in every province and territory except Nunavut (Table 1). Most of these policies, such as the *Mineral Act*, *Mining Act*, and *Oil and Gas Act*, have an environmental section to ensure that rehabilitation and restoration plans are integrated into the development of the project. As an example, the *Mining Act* (Section 232.3) of Quebec states “*rehabilitation and restoration plans shall contain, in particular, the description of the rehabilitation and restoration work relating to the mining activities carried on by the person submitting the plan and intended to restore the affected land to a satisfactory condition*” Further, technical specifications for meeting restoration criteria are instructed in guidelines and/or manuals in each province and territory (Table 2).

Given its long-standing position as one of the top oil and gas producers in the world, the province of Alberta has more than 50 years of experience with environmental policies containing specific regulations and guidelines for reclamation of disturbed landscapes (Table 3). As a key driver of restoration and reclamation activities, Alberta became the first province in Canada to enact legislation on land reclaimed in 1963 (Table 3). Since 1993, the *Environmental Protection and Enhancement Act* mandates restoration and land reclamation of sites to its “*equivalent land capability*”, which is defined as the ability of the land to support various post-disturbance land uses that are similar to pre-disturbance conditions, but not necessarily identical to them, based on topography, drainage, hydrology, soils, and vegetation (Section 1(e) and 1(k) of Conservation and Reclamation Regulation).

In addition to legislation to assist mining and oil and gas site closure, we found that multiple restoration and reclamation guidelines have been developed by practitioners in every P&T (except Prince Edward Island) to focus on particular features of the landscape such as coal mines, orphaned well, tailings ponds, seismic lines, or wetland (Table 3). Reclamation activities are also supported by practitioners and associations such as the Canadian Land Reclamation Association, formed in 1975, who provide technical support and networking to implement restoration and reclamation on the ground [33].

Table 3. Industrial land conservation and reclamation legislation in Alberta over time since Alberta assumed control of its natural resources from the federal government in 1930 (modified from [34]).

Year	Legislation	Significance
1935	<i>Control of Soil Drifting Act</i>	Proper use of tillage equipment to combat erosion
1947	<i>Right of Entry Arbitration Act</i>	Enacted to address the conflicts between holders of mineral rights and owners of surface rights
1949	<i>Provincial Lands Act</i>	Later amended in 1969 to grant the legal powers to the responsible department to issue reclamation orders and certificates
1962	<i>Soil Conservation Act</i>	Prevention of soil loss or deterioration

1963	<i>Surface Reclamation Act</i>	Alberta to become the first province to enact legislation on land reclamation
1972	<i>Surface Rights Act</i>	Replaced the Right of Entry Arbitration Act
1973	<i>Land Surface Conservation and Reclamation Act</i>	Replaced the Surface Reclamation Act
1983	<i>Land Surface Conservation and Reclamation Act (amended)</i>	Definition of surface disturbance added, orders to remediate contamination on an industrial site, and legal requirement for soil conservation
1991	<i>Natural Resources Conservation Board Act</i>	Review of proposed developments affecting non-energy natural resources in Alberta (e.g., forestry and tourism)
1993	<i>Environmental Protection and Enhancement Act</i>	Obligation to reclaim land to equivalent land capability and to require remediation of contamination
2009	<i>Alberta Land Stewardship Act</i>	Need to manage activity for current and future generations, including Indigenous Peoples

3.2.2. Sustainable Forest Management

Federal and P&T's sustainable forest management legislations and policies support restoration in various ways (Tables 1 and 2). Sustainable forest management (SFM) and forest stewardship in Canada are directed by the Canadian Council of Forest Ministers which was established in 1985 by the federal, provincial, and territorial ministers responsible for forests to set the overall direction for SFM at the national level. Since then, SFM in Canada uses criteria and indicators based on the internationally recognized Montreal Process [35]. The framework consists of 6 criteria and 46 indicators, with the 6 criteria being (1) biological diversity; (2) ecosystem condition and productivity; (3) soil and water; (4) ecological cycles; (5) economic benefits; and (6) society's responsibility. Restoration and reforestation efforts are mentioned in criteria 1 and 2 to improve the genetic diversity and improve vulnerable, threatened, and endangered species, respectively. Afforestation is also mentioned in criteria 2 in order to accelerate carbon sequestration. In addition, Canada reports on its progress on forest sustainability in its annual State of Canada's Forest report, which presents current information on trends and statistics related to sustainable forest management in Canada and provides comprehensive data sources and information [36]. It tracks various indicators pertaining to sustainability including forest area, deforestation and afforestation, and forest regeneration, among other forest-sustainability-related indicators (Appendix A, Figure A1).

Ninety-three percent of Canada's forest land is publicly owned (defined as Crown lands) and managed under P&T legislation. While less than 800,000 ha are harvested every year, forest loss caused by forestry activities remains significantly low at 0.014% of Canada's forest per year between 2005 and 2010 (Appendix A, Figure A1). Successful regeneration is required following forest harvesting on public lands. In 2018, at least 427 million seedlings were planted on 350,000 ha of provincial forest lands in Canada. An additional 6000 ha of forest were established by seeding (Appendix A, Figure A1).

In some P&Ts, including Alberta, Saskatchewan, Ontario, Québec, and Prince Edward Island, forest policies are written in a way that reflects the principles of ecological restoration, such as the conservation and protection of ecologically critical areas and maintenance of healthy ecosystems and ecological processes by mimicking natural disturbances regimes such as wildfire. In addition to the commercial value of the forest, forest management plans are required by P&T laws to ensure that forest industries integrate other ecosystem values and services (e.g., soil, water, wildlife, and biodiversity) into their agreement or licence application.

3.2.3. Environmental Impact Assessment

Starting in 1992, resource development projects occurring in areas under federal jurisdiction were required to conduct assessments under the *Canadian Environmental Assessment Act* (CEAA). The CEAA and its regulations established the legislative basis for the federal government to “*identify potential adverse environmental effects; propose measures to mitigate adverse environmental effects; predict whether there will be significant adverse environmental effects, after mitigation measures are implemented; and includes a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures*” [37]. The CEAA was replaced by the *Impact Assessment Act* (IAA) in 2019; the new *Act* lays greater emphasis on meaningful consultation and engagement with Indigenous Peoples and local communities and the integration of traditional knowledge and the rights of Indigenous Peoples into the environmental assessment process. Moreover, the IAA expands on the meaning of “adverse effects” from significant adverse environmental effects under CEAA to all effects (both positive and adverse) and requires mitigation measures to eliminate, reduce, control, or offset the adverse effects and to pay for any damage through restoration or any other means (IAA, Section 22.1).

All P&Ts have environmental assessment and protection policies in place to require the identification of environmental impacts and mitigation measures during the various phases of project development (Tables 1 and 2). With varied terms and definitions, mitigation measures in general indicate actions to recover an ecosystem to a former condition, to a beneficial use, or to a condition satisfactory to the government and are required in an application for project development.

3.2.4. National Parks and Protected Areas

Parks Canada developed the first national principles and guidelines for ecological restoration in the world [10]. These guidelines formed the basis for the first global advice on restoration [11]. Developed in collaboration with the SER and the Indigenous Peoples’ Restoration Network, these principles describe an approach to ecological restoration that will ensure that parks and protected areas continue to safeguard ecological integrity while providing opportunities for meaningful engagement with multiple stakeholders and rights-holders (e.g., Indigenous Peoples, NGOs, communities, and visitors) within the network of Canada’s protected areas. The *Canada National Parks Act* (Section 8.2) also provides a legal basis for maintenance and restoration of ecosystem integrity through preserving ecologically critical areas at a landscape scale on federal lands. This *Act* defines that a national park should conserve and restore regional characteristics such as abiotic components and biodiversity to support ecological processes (e.g., natural disturbances and prey–predator dynamics) and ecosystem integrity in a broader sense [10].

Every province and territory has enacted at least one policy to support the designation and management of protected areas and parks for ecological purposes on public lands (Table 1). The designation of protected areas and parks at provincial and territorial levels is more complete than at the federal level in that they include wilderness areas, ecological reserves, conservancies, areas for tourism, natural areas, and heritage rangelands (i.e., a mix of strict protection, research, or human use).

In addition to the policies that regulate and promote FLR within protected areas, we found the emergence of policies supporting Indigenous-led conservation initiatives such as Indigenous Protected and Conserved Areas (IPCAs), for which restoration of degraded landscapes is central to regaining ecological integrity (Table 2). These policies are often guided by multiples goals, including developing Indigenous leadership and stewardship to conserve, restore, and manage the land, but foremost rebuilding relationships between the federal and Indigenous governments in the spirit of reconciliation. As an example, the Indigenous Guardians Program, led by Environment and Climate Change Canada (ECCC), aims to recognize Indigenous rights and reconciliation in protecting and conserving ecosystems, as well as developing and maintaining sustainable economies in healthy

ecosystems [38]. This program is also accompanied by a Nature-Smart Climate Solutions Fund to support Indigenous-led projects that restore and enhance wetlands and grasslands to mitigate climate change.

3.2.5. Species at Risk and Their Habitats

Recovery and habitat management for species at risk is also an important driver of restoration activities on forested land. The federal *Species at Risk Act* (SARA) is a result of the implementation of the Canadian Biodiversity Strategy in response to the United Nations Convention on Biological Diversity [39]. The purposes of the Act are “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” (SARA, Section 6). An independent body of experts, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), exists to provide scientifically sound assessments to identify and classify species at risk. SARA applies to species found on lands administered by a federal government (e.g., national parks) and species falling under federal legislative powers (e.g., aquatic species and migratory birds under the *Migratory Birds Convention Act* (1994)) [40,41]. However, the Canadian federal government can issue emergency orders under SARA (SARA, Section 80) for species of concern that are found outside of its jurisdiction and “face imminent threats to its survival or recovery” (SARA, Section 80.2) when provincial or territorial governments fall short of taking acceptable action to protect the species.

One of the well-documented examples of SARA implementation on non-federal lands is the federal recovery strategy of the woodland caribou (*Rangifer tarandus caribou*), which has been listed as threatened since 2002 [42]. Under SARA, the federal recovery strategy was developed in collaboration with various organizations, including P&Ts, to establish range plans that ensure at least 65% of the caribou range is undisturbed [43]. One of the three pillars of the recovery strategy recommends to “conduct research to optimize habitat recovery through forest landscape restoration approaches and the development of tools and practices to support restoration success at the site level” [44]. In addition to SARA, the *Canada Wildlife Act* designates wildlife areas for research and/or critical habitat protection purposes (e.g., migratory birds and at-risk species), although the intent of the Act is to mainly regulate hunting activities.

Similar to the federal level, wildlife policies in P&Ts were originally developed to regulate hunting activities, but have since shifted their focus to also include legal requirements concerning conservation and protection of endangered species and their habitats (Table 2).

3.2.6. Climate Change

Recently, the Canadian Climate Change Adaptation and Actions Plan has added significant emphasis on FLR, where “protecting and restoring nature are important parts of Canada’s efforts to mitigate and adapt to climate change” is transversal to multiple land uses [45]. Nature-based solutions are central in this strategy to protect 25% of Canada’s land by 2025 and reach net-zero greenhouse gas (GHG) emissions by 2050 to fight climate change. For example, the 2 Billion Trees program led by Natural Resources Canada (NRCan) and the Nature-Smart Climate Solutions program led by ECCC are the two main federal programs where restoration of forested landscapes (including urban forests) is key to meeting climate targets and other SDGs (Table 2). Both programs aim to achieve multiple objectives towards enhanced ecosystem management and reduced GHG emissions by supporting tree planting to increase carbon sequestration and forest resilience to climate change, while promoting landscape restoration for biodiversity. The programs also have a socio-economic dimension to support human well-being, especially in Indigenous communities, by creating green jobs and reducing community risks to natural disasters like wildland fires and floods [45].

4. Discussion

4.1. Closing the Gaps in Restoration Science, Policy, and Practice

The observed increase over time in the number of restoration-related publications in our literature review confirmed that halting and reversing current trends of degradation by scaling up restoration efforts is gaining importance in Canada and globally. The results also showed that the policy dimensions of restoration remain largely under-documented in the scientific literature despite their key role in implementing effective restoration measures on the ground [46–49]. This trend confirms the complexity of integrating restoration policies more broadly into environmental law [50,51]. Too often, restoration legislation faces challenges at the implementation stage and fails to mitigate the impacts of rapid global changes at the local and regional scales [52]. Despite the political momentum at the international level, the implementation of effective restoration project on the ground can be difficult, as public-facing commitments do not necessarily reflect actual policy and practices [53]. Recent research suggests that restoration implementation is constrained at the national level for reasons that include financial capacities, access to data, lack of monitoring, inadequate policy and governance, community opposition, existing land-use entitlements, and the lack of meaningful legal accountability for compliance [30,54]. Moreover, given the cumulative effects of environmental and anthropogenic stressors, complex and synergistic impacts operating over a large range of spatiotemporal scales can challenge the effectiveness of individual restoration projects [55]. Indeed, while millions of hectares of land worldwide have been committed to restoration, many landscape and ecosystem restoration initiatives are unlikely to be effective given incomplete or inadequate policy, including poor monitoring practices and the lack of long-term and adaptive management plans [56].

Therefore, a policy scan such as this study represents a practical tool for learning lessons and identifying gaps in future policy development and research. However, such studies remain rare in the literature. Without conducting an extensive search, we identified only two studies similar to ours, one from Australia [57] and one from the United States [58], both of which examined decades of existing restoration programs or policies. Both concluded that, despite science-based policies and best practices, implementation remains too fragmented, often confined to a particular ecosystem or land type, and difficult to scale up without massive investment and effective collaboration with multiple stakeholders.

Considering the changing paradigm towards the multifunctional values of the landscape as well as the need for integrating climate change mitigation into land-use management, it is essential to realign restoration policy and restoration science to accelerate the recovery of degraded landscapes in the current context [12,47,59]. In a rapidly changing world, where historical ecosystem conditions are altered by multiple land uses and environmental stressors, the concept of novel ecosystems is an example of pragmatic and flexible approaches to help achieve restoration goals [60–62]. A novel ecosystem is defined as “a system of abiotic, biotic, and social components (and their interactions) that, by virtue of human influence, differs from those that prevailed historically, having a tendency to self-organize and manifest novel qualities without intensive human management” [60]. While the novel ecosystem concept has become popular over the last decade, it has also raised debates in the restoration community [63,64]. Interestingly, while there is mounting evidence that the fundamental environmental drivers of ecosystems are undergoing unprecedented change, policies are still limited to conventional approaches for restoring lost ecological processes and enhancing ecosystem services in transformed landscapes where such a return is deemed infeasible.

With the need to build more capacity across restoration practitioners and organisations, the United Nations Decade on Ecosystem Restoration, launched in collaboration with the FAO, represents a unique opportunity to bring together and bring into the mainstream the various restoration pathways and objectives in a coordinated manner, as well

as to massively scale up restoration projects across the globe [65]. With restoration principles and guidelines becoming more available and applied [8,66–68], there is an opportunity to bridge the gaps between restoration science and the policy agenda and develop a shared vision of ecosystem restoration. As the discipline of restoration is evolving rapidly, policymakers, in Canada or elsewhere, are in a unique position to develop science-based and flexible policies that account for the full set of ecosystem restoration objectives and values and that strengthen the capacity for practitioners and scientists to respond to ongoing and future changes [59,62].

4.2. Reviving Canadian Leadership in Restoration

Although our study is not exhaustive and shows only a 360-degree view of the FLR policy dimension, our results highlight that Canada is well equipped in terms of FLR legislations and policies. Indeed, driven by one of the largest natural resources sectors in the world, Canada plays an outsized role in leading and developing the field of ecological restoration, as represented by the Canadian membership (14%) of the SER (the highest per capita in the world). Since 1989, three of eleven chairs of the SER have been Canadian. Canadian universities such as the University of Alberta and the University of Victoria have been pioneers in developing world-class restoration programs and certificates [69]. The numerous policy instruments listed in this study reflect the need to ensure profitable, but sustainable access to those natural resources for the benefit of Canadians, as well as to maintain competitiveness in the international market. Canada was the first industrialized country to sign and ratify the CBD in 1992 and is recognized as a global leader in sustainable forest management. In addition to leading the world in forest certification (as of 2018, Canada had 164 Mha of independently certified forest land, representing more than 48% of the country's forests and 37% of all certified forests worldwide; [70]), Canada is among the few countries to have implemented science-based criteria and indicators to monitor deforestation [71].

Despite the numerous policy instruments available, the execution of environmental legislation in Canada has been challenged lately [16,72]. Indeed, reclamation activities in the oil patch in Alberta have epitomized the complexity of implementing effective restoration, despite the 50 years of active legislation [37,73]. The same is true for the implementation of SARA in the context of the woodland caribou recovery strategy [44,74,75]. Therefore, a fundamental challenge for the Canadian land sector will be to convert policy aspirations into realisable and quantifiable targets in conjunction with other land-use objectives and values. Given the rapid changes in structure, function, and human dimension in Canadian forests, there is an opportunity to develop a more adaptive and inclusive restoration agenda [60,76,77]. For example, given the mounting recognition of the significant role that Indigenous Peoples play in biodiversity conservation and the protection of cultural heritage [78], Canada could lead the way in supporting Indigenous-led conservation and restoration initiatives like IPCAs. Supporting Indigenous leadership and integrating Indigenous knowledge can help to transform the policy, governance, and management of conservation actions and honor the Indigenous relationships with the land and the nation-to-nation reconciliation [79]. Capacity building and collaboration with Indigenous Peoples is thus essential to develop more holistic practices in order to achieve the multiple goals of restoration.

Moreover, with the valuation of natural capital and NBS becoming more tangible as part of solutions to mitigate climate change [80–82], Canada is well positioned to invest in its natural capital to limit the negative impacts of climate change and contribute to the Paris Agreement. In the case of highly altered landscapes, where historical conditions have been lost beyond which the practical efforts of traditional restoration are feasible, combining flexible approaches with NBS to design future ecosystems and green infrastructure should be investigated further [83,84]. Finally, another pathway to galvanise restoration activities through policy-making is to recognise and invest in the restoration economy [69]. Supporting already more than 400,000 employees through activities related

to site assessment and reclamation in Canada, the restoration economy is a promising sector to simultaneously ease pressure on the environment and create jobs and revenues [85–87]. With a more inclusive and adaptive restoration agenda developed to respond to ongoing and future changes, Canada can forge new pathways to establish goals and identify key measures to meet its international commitments to restoration, climate change, and biodiversity conservation.

5. Conclusions

Considering the imperative to mitigate and lower the pace of environmental degradation, this study provides the first national restoration policy scan in Canada focusing on forests. Our review highlights that restoration is gaining significance as a research topic globally and in Canada, while the policy dimension of restoration remains under-documented, as observed worldwide. Although not exhaustive, our study also highlights that, given its large natural resources sector and SFM practices, Canada has established itself as a pioneer in restoration supported by science-based policies and long-term collaboration between the industrial forestry sector, the different levels of government, and academia. However, as the uses and values of forested landscapes are changing rapidly, the main challenge will be to develop multi-stakeholder approaches including Indigenous Peoples to implement policy aspirations into realizable and quantifiable targets in conjunction with other land-use objectives and values. In the face of increasing pressures on the landscapes, a changing climate, and increased societal demands for ecosystem services, the research–policy interface is needed more than ever not only to respond to ongoing and future changes, but also to generate applied knowledge transferable into the land-use and restoration agenda.

Author Contributions: Conceptualization, N.M.; methodology, N.M., H.H. and R.G.; software, H.H. and R.G.; formal analysis, H.H. and R.G.; resources, H.H. and R.G.; writing—original draft preparation, N.M., C.M., B.K. and E.H.; writing—review and editing, N.M., H.H., R.G., C.M., B.K. and E.H.; visualization, H.H. and N.M.; project administration, N.M.; funding acquisition, N.M. All authors have read and agreed to the published version of the manuscript.

Funding: The funding for this work was provided by “Restoration of Working Landscapes (Re-WoL)” project funded by the Office of Energy Research and Development and “Cumulative Effects” Program funded by Natural Resources Canada—Canadian Forest Service.

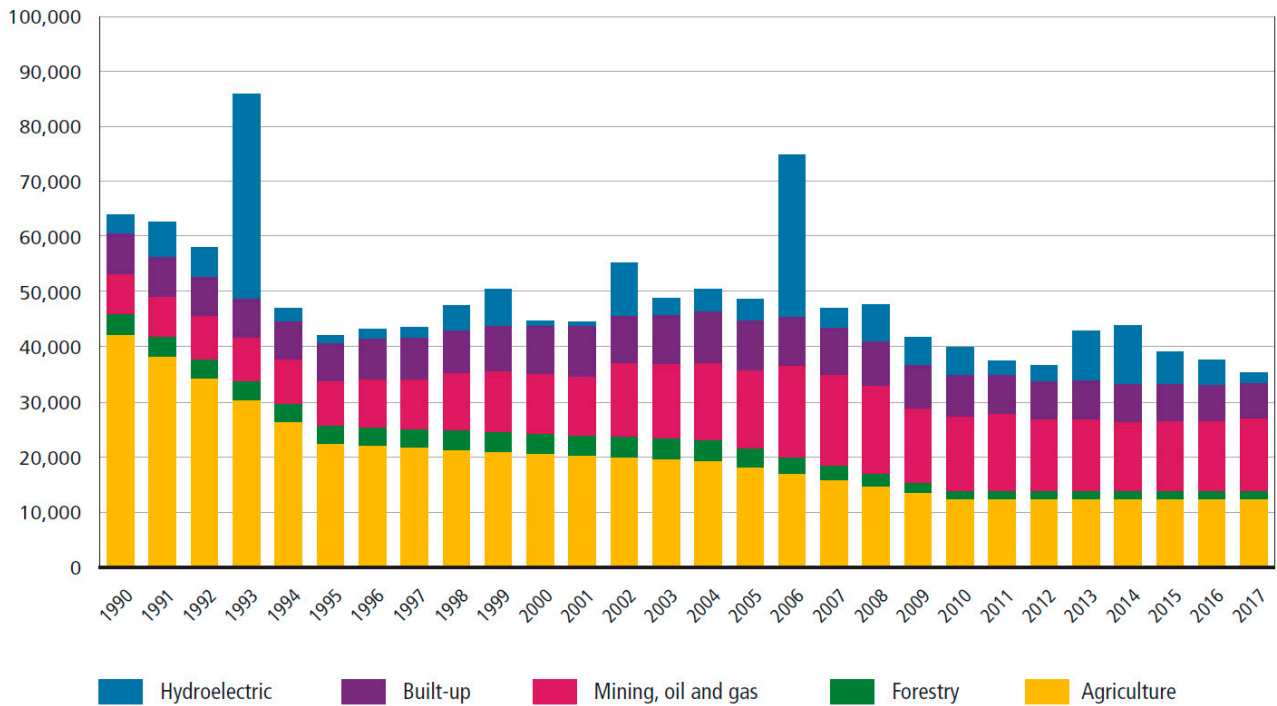
Data Availability Statement: Not applicable.

Acknowledgments: Our sincere thanks goes to Amelie Roberge for useful comments on the manuscript.

Conflicts of Interest: The authors declare no conflict of interest

Appendix A

(a)



(b)

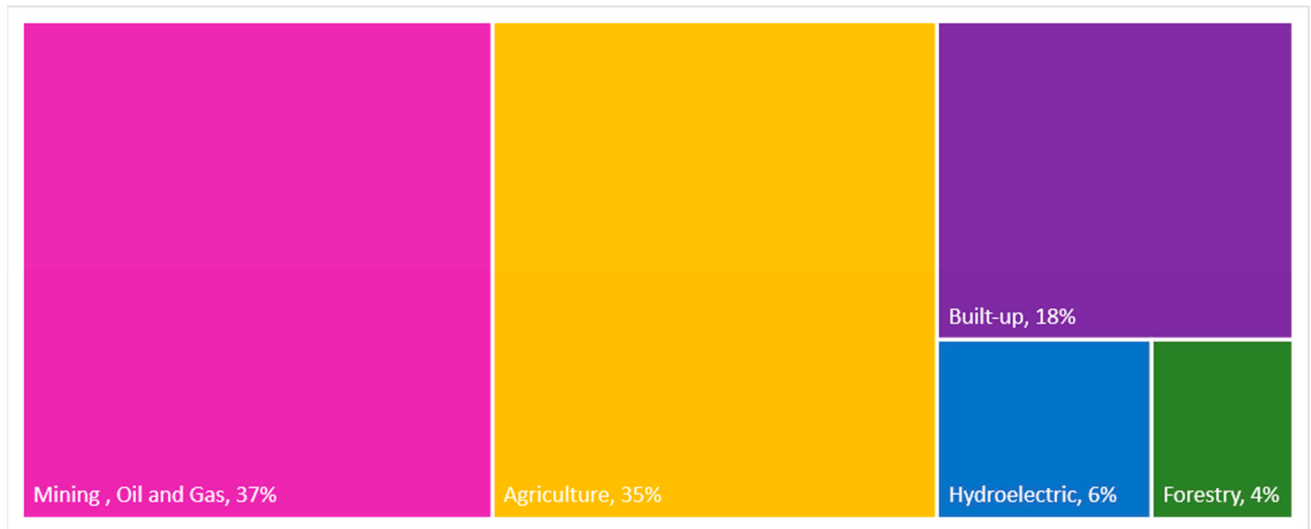


Figure A1. (a) Estimated areas of annual deforestation and (b) causes of deforestation in Canada as of 2017 by industrial sector. Canada has 347 Mha of forest area (2017). Canada’s low annual deforestation rate has declined over the last 27 years, dropping from 64,000 ha per year (ha/yr) in 1990 to about 35,000 ha/yr in 2017. Between 1990 and 2017, less than half of 1% of Canada’s total forest area was converted to other land uses. Deforestation is defined as the permanent clearing of forests to non-forest land uses [36].

Appendix B

Table A1. List of provincial, territorial, and federal policies mandating restoration, rehabilitation, reclamation, remediation activities, and/or sustainable development categorized by attributes and jurisdictions.

<i>Provincial & territorial</i>	<u>British Columbia</u>	1. Mines Act
		2. Oil and Gas Activities Act
		3. Forest and Range Practices Act
		4. Forest Act
		5. Environmental Assessment Act
		6. Environmental Management Act
		7. Ecological Reserve Act
		8. Environment and Land Use Act
		9. Protected Areas of British Columbia Act
		10. Park Act
		11. Wildlife Act
	<u>Alberta</u>	12. Forest Reserves Act
		13. Forests Act
		14. Environmental Protection and Enhancement Act
		15. Provincial Park Act
		16. Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands
		17. Wildlife Act
		18. Oil and Gas Conservation Act
	<u>Saskatchewan</u>	19. Forest Resources Management Act
		20. Provincial Lands Act
		21. Environmental Management and Protection Act
		22. Parks Act
		23. Provincial Lands Act
		24. Wildlife Act
		25. Oil and Gas Act
	<u>Manitoba</u>	26. Surface Rights Act
		27. Forest Act
		28. Environment Act
		29. Provincial Park Act
		30. Ecological Reserves Act
		31. Endangered Species and Ecosystem Act
		32. Wildlife Act
	<u>Ontario</u>	33. Mining Act
		34. Crown Forest Sustainability Act
		35. Forestry Act
		36. Environmental Protection Act
		37. Environmental Assessment Act
		38. Provincial Parks and Conservation Reserves Act
		39. Fish and Wildlife Conservation Act
		40. Endangered Species Act
	<u>Quebec</u>	41. Mining Act
		42. Sustainable Forest Development Act

	43. Environment Quality Act
	44. Natural Heritage Conservation Act
	45. Parks Act
	46. Act respecting the conservation and development of wildlife
<u>New Brunswick</u>	47. Mining Act
	48. Crown Land and Forests Act
	49. Clean Environment Act
	50. Protected Natural Areas Act
	51. Parks Act
<u>Nova Scotia</u>	52. Mineral Resources Act
	53. Forests Act
	54. Forest Enhancement Act
	55. Environment Act
	56. Provincial Parks Act
	57. Wildlife Act
<u>Prince Edward Island</u>	58. Mineral Resources Act
	59. Forest Management Act
	60. Environmental Protection Act
	61. Natural Areas Protection Act
	62. Wildlife Conservation Act
<u>Newfoundland and Labrador</u>	63. Mineral Act
	64. Mining Act
	65. Forestry Act
	66. Environmental Protection Act
	67. Wilderness and Ecological Reserves Act
	68. Endangered Species Act
<u>Northwest Territories</u>	69. Oil and Gas Operations Act
	70. Forest Management Act
	71. Environmental Protection Act
	72. Protected Areas Act
	73. Wildlife Act
<u>Yukon</u>	74. Oil and Gas Act
	75. Forest Resources Act
	76. Environment Act
	77. Parks and Land Certainty Act
	78. Wildlife Act
<u>Nunavut</u>	79. Forest Management Act
	80. Environmental Protection Act
	81. Wildlife Act
<i>Federal</i>	82. Canada Oil and Gas Operations Act
	83. Forestry Act
	84. Canadian Environmental Protection Act
	85. Impact Assessment Act
	86. Yukon Environmental and Socio-economic Assessment Act
	87. Nunavut Planning and Project Assessment Act
	88. Mackenzie Valley Resource Management Act
	89. Canada National Parks Act
	90. Canada Wildlife Act
	91. Species at Risk Act

Appendix C

Table A2. List of guidelines, standards, framework, or best management practices supporting restoration, rehabilitation, reclamation, and remediation activities categorized by attributes and jurisdictions (links verified on 25 September 2022).

	92. BC Oil and Gas Commission. 2013. Schedule B – site reclamation assessment. 6 p. https://www.bcogc.ca/node/5756/download
	93. Ministry of Water, Land and Air Protection, Biodiversity Branch. 2002. Ecological restoration guidelines for British Columbia. http://www.env.gov.bc.ca/fia/documents/TERP_eco_rest_guidelines/intro/index.html
	94. British Columbia Oil and Gas Commission. 2020. Site remediation and reclamation manual. https://www.bcogc.ca/node/12445/download
	95. British Columbia Oil and Gas Commission. 2013. Restoration verification audit program procedure manual. 9 pp. https://www.bcogc.ca/node/8029/download
	96. Wetland Stewardship Partnership. 2009. Interim guidelines for wetland protection and conservation in British Columbia, Chapter 7: Oil and gas extraction. 17 pp. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/wetland_ways_ch_7_oil_and_gas.pdf
	97. Natural Resource Board, Government of British Columbia. 2016. Cumulative effects framework interim policy. 32 pp. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/cumulative-effects/cef-interimpolicy-oct_14_-2_2016_signed.pdf
<i>Provincial & territorial</i>	98. Ministry of Environment, Ecosystems Branch, Environmental Sustainability and Strategic Policy Division. 2014. Procedures for mitigating impacts on environmental values (environmental mitigation procedures) version 1.0. 70 pp. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/environmental-mitigation-policy/em_procedures_may27_2014.pdf
<i>British Columbia</i>	99. British Columbia Oil and Gas Commission. 2018. Environmental protection and management guideline. 126 pp. https://www.bcogc.ca/node/5899/download
	100. Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Government of British Columbia. 2017. Provincial timber management goals, objectives, and targets. 18 pp. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/silviculture/timbergoalsobjectives2017apr05_revised.pdf
	101. Wetland Stewardship Partnership. 2008. Interim guidelines for wetland protection and conservation in British Columbia, Chapter 5: Forestry. 19 pp. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/wetland_ways_ch_5_forests.pdf
	102. Ministry of Environment and Climate Change Strategy, Government of British Columbia. 2019. Strategic climate risk assessment framework for British Columbia. 60 pp. https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/climate-risk-assessment-framework.pdf
<i>Alberta</i>	103. Government of Alberta. 1997. Conservation and reclamation guidelines for Alberta. https://open.alberta.ca/dataset/d6df9a74-57ef-4e39-a9cf-a67dc127e6ff/resource/ee760f07-3da9-4401-9d4f-3601c55bbfc3/download/conservationreclamationguideline-il-1997.pdf
	104. Alberta Environment. 2010. Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region, 2nd Edition. Prepared by the Terrestrial Subgroup of the Reclamation Working Group of the Cumulative Environmental Management Association, Fort McMurray, AB. December 2009. https://open.alberta.ca/dataset/966069fc-7910-

- 4fc5-85da-3a717bfbd5/resource/1056c2a6-0815-4d0a-ab0c-80938e1e5bd1/download/8269.pdf
105. Alberta Environment and Sustainable Resource Development. 2013. Alberta regeneration standards for the mineable oil sands. Government of Alberta, Department of Environment and Sustainable Resource Development, Edmonton, Alberta. 71 pp. <https://open.alberta.ca/dataset/06eb88bf-a6dc-412f-83a5-d61cb556da9f/resource/06e58c27-da76-49d8-9fc2-5b9e8a5f58bf/download/2013-alberta-regeneration-standards-mineable-oil-sands-may-1-2013.pdf>
106. Alberta Environment and Parks. 2015. Coal and oil sands exploration reclamation requirements. <https://open.alberta.ca/dataset/46dbd207-c202-4907-a4f1-4660dc03c2c7/resource/25510b29-240b-4ad1-acbf-24e3c43d1dd5/download/coaloilsandsreclamationreqs-dec02-2015.pdf>
107. Alberta Environment and Parks. 2019. Alberta soil and groundwater remediation guidelines. Land Policy Branch, Policy and Planning Division. 198 pp. <https://www.alberta.ca/part-one-soil-and-groundwater-remediation.aspx>
108. Environment and Sustainable Resource Development. 2013. 2010 Reclamation criteria for well sites and associated facilities for cultivated lands. 92 pp. <https://open.alberta.ca/dataset/ee82f0ab-fef2-4b78-805d-8c6d341aab2/resource/54dd817c-225a-483a-a3f1-09cab3136743/download/2013-2010-reclamation-criteria-wellsites-cultivated-lands-2013-07.pdf>
109. Alberta Environment and Parks. 2016. Alberta environmental site assessment standard. 36 pp. <https://open.alberta.ca/dataset/3acc7cff-8c50-44e8-8a33-f4b710d9859a/resource/579321b7-5b66-4022-9796-31b1ad094635/download/environsiteassessstandard-mar01-2016.pdf>
110. Alberta Sustainable Resource Development. 2006. Alberta Forest Management Planning Standard. 114 pp. [https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/formain15749/\\$FILE/ForestManagementPlanningStandard-2006.pdf](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/formain15749/$FILE/ForestManagementPlanningStandard-2006.pdf)
111. Department of Agriculture and Forestry, Forestry Division, Forest Management Branch. 2018. Reforestation standard of Alberta. <https://open.alberta.ca/publications/7010852>
112. Alberta Sustainable Resource Development. 2010. Climate change adaptation framework manual. 38 pp. <https://open.alberta.ca/dataset/8afd8ec2-cb2c-4dc5-94fe-f66f935b51e4/resource/23b3acd1-9a45-458f-bf0a-bdb7fa287d98/download/2010-climatechangeadaptationmanual-apr1-2010.pdf>
-
113. Saskatchewan Ministry of Environment. 2007. Reclamation and approvals guidelines. <https://publications.saskatchewan.ca/api/v1/products/83119/formats/95518/download>
114. Saskatchewan Mineral Exploration and Government Advisory Committee. 2016. Mineral exploration guidelines for Saskatchewan. http://saskmining.ca/ckfinder/userfiles/files/BMP%20August%202016_Draft.pdf
115. Saskatchewan Petroleum Industry/Government Environmental Committee. 2009. Saskatchewan upstream petroleum sites remediation guidelines. Guideline No. 4. <http://publications.gov.sk.ca/documents/310/84469-PDBENV07.pdf>
116. Ministry of Agriculture. 2019. Restoration of Saskatchewan's agricultural crown rangelands – guidelines and procedures for developers. 17 pp. <http://publications.gov.sk.ca/documents/20/86257-Restoration%20of%20Saskatchewan's%20Agricultural%20Crown%20Rangelands.pdf>
117. Ministry of Environment. 2008. Northern mine decommissioning and reclamation guidelines. 17 pp. <https://publications.saskatchewan.ca/api/v1/products/76976/formats/96788/download>

Saskatchewan

118. Government of Saskatchewan. 2018. Environmental review guidelines for oil and gas activities. 34 pp.

<https://publications.saskatchewan.ca/api/v1/products/78871/formats/89138/download>

119. Ministry of Environment. 2017. Forest management planning standard: Saskatchewan environmental code.

<https://publications.saskatchewan.ca/api/v1/products/77492/formats/86843/download>

120. Government of Saskatchewan. 2018. Saskatchewan's climate resilience measurement framework. 8 pp.

<https://publications.saskatchewan.ca/api/v1/products/92479/formats/109479/download>

121. Government of Manitoba. 2001. Manitoba mine closure regulation 67/99 general closure plan guidelines.

<https://www.manitoba.ca/iem/mines/acts/closureguidelines.html>

122. Manitoba Sustainable Development, Forestry and Peatlands Branch. 2017.

Manitoba's submission guidelines for peatland recovery plans: Peatland management guidebook. https://www.gov.mb.ca/sd/pubs/forestry_peatlands/prp_guidelines.pdf

123. Department of Manitoba Sustainable Development. 2016. Environmental site assessments in Manitoba.

Manitoba

https://www.gov.mb.ca/sd/envprograms/contams/pdf/guidelines/environmental_site_assessments_in_manitoba_e.pdf

124. Manitoba Conservation, Forestry Branch. 2007. Manitoba's submission guidelines for twenty year forest management plans.

https://www.gov.mb.ca/sd/forestry/pdf/practices/20_year_forest_plan_2007.pdf

125. Climate and Green Plan Implementation Office, Government of Manitoba. 2017. A made-in-Manitoba climate and green plan: Hearing from Manitobans. 64 pp.

https://www.gov.mb.ca/asset_library/en/climatechange/climategreenlanddiscussionpaper.pdf

126. Ministry of Natural Resources and Forestry. 2017. A wetland conservation strategy for Ontario. 52 pp. https://files.ontario.ca/mnr_17-075_wetlandstrategy_final_en-accessible.pdf

127. Oil, Gas and Salt Resources of Ontario, Provincial Operating Standards. Retrieved on April 15, 2020 from <https://www.ontario.ca/document/oil-gas-and-salt-resources-ontario-provincial-operating-standards>

128. Ministry of Natural Resources. 2013. Best management practices for mineral exploration and development activities and woodland caribou in Ontario. 18 pp.

http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_bmp_min_dev_car_en.pdf

Ontario

129. Ministry of the Environment, Conservation and Parks. 2019. Environment Assessment Process, submission and evaluation. Retrieved on April 14, 2020 from <https://www.ontario.ca/document/preparing-and-reviewing-environmental-assessments-ontario/environment-assessment-process-submission-and-evaluation>

130. Ministry of Natural Resources. 2012. Categorizing and protecting habitat under the Endangered Species Act. 10 pp. Retrieved on April 15, 2020 from

<https://www.ontario.ca/page/categorizing-and-protecting-habitat-under-endangered-species-act>

131. Ministry of Natural Resources and Forestry. 2014. Forest management guide for boreal landscapes. 114 pp. <https://docs.ontario.ca/documents/4543/boreal-landscape-guide-march-11-2014-final-s.pdf>

132. Ministry of Natural Resources. 2001. Forest management guide for natural disturbance pattern emulation. 40 pp. <https://docs.ontario.ca/documents/2801/guide-natural-disturbance.pdf>

133. Ministry of Natural Resources and Forestry. 2017. Forest management planning manual. 464 pp. <https://files.ontario.ca/mnrf-forest-management-planning-manual-en-2019-10-03.pdf>

134. Ministry of Natural Resources and Forestry. 2017. Forest information manual. 93 pp. <https://files.ontario.ca/mnrf-forest-information-manual-en-2019-10-03.pdf>

135. Ministry of the Environment, Conservation and Parks. 2018. Preserving and protecting our environment for future generations: a made-in-Ontario environment plan. 54 pp. <https://prod-environmental-registry.s3.amazonaws.com/2018-11/EnvironmentPlan.pdf>

136. Guidelines for preparing mine closure plans in Québec. <https://mern.gouv.qc.ca/en/mines/mining-reclamation/guidelines-for-preparing-mine-closure-plans-in-quebec/>

137. Environmental and Social Impact Assessment (ESIA). <https://www.cngov.ca/environment/environmental-social-impact-assessment/>

138. Ministère des Forêts, de la Faune et des Parcs. 2015. Sustainable forest management strategy. <https://mffp.gouv.qc.ca/english/publications/forest/sustainable-forest-management-strategy.pdf>

Quebec

139. Ministère des Forêts, de la Faune et des Parcs. Guide to the application of the regulation respecting the sustainable development of forest in the domain of the State, [Online], Gouvernement du Québec. <https://mffp.gouv.qc.ca/RADF/guide/?lang=en>

140. Cabinet du ministre de l'Environnement et de la Lutte contre les changements climatiques Programme Action-Climat Québec <https://www.environnement.gouv.qc.ca/programmes/ActionClimat/index.htm#:~:text=Action%2DClimat%20Qu%C3%A9bec%20est%20un,2020%20sur%20les%20changements%20climatiques.>

141. Department of Energy and Resource Development. YEAR. Guide to the development of a mining and reclamation plan in New Brunswick. 9 p. https://www2.gnb.ca/content/dam/gnb/Departments/en/pdf/Minerals-Minerales/Guide_Mining_Reclamation-e.pdf

142. Department of Environment and Local Government. 2018. A guide to environmental impact assessment in New Brunswick. 42 pp. <https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/GuideEnvironmentalImpactAssessment.pdf>

New Brunswick

143. Department of Natural Resources and Energy Development. 2004. Forest management manual for New Brunswick Crown land. 146 pp. <https://www2.gnb.ca/content/dam/gnb/Departments/nr-rn/pdf/en/Publications/ForestManagementManual.pdf>

144. Department of Environment and Local Government. 2016. Transitioning to a low carbon economy, New Brunswick's climate change action plan. 23 pp. <https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Climate-Climatiques/TransitioningToALowCarbonEconomy.pdf>

145. Policy and Corporate Services Division, Environmental Assessment Branch. 2009. Guide for surface coal mine reclamation plans. 17 pp. <https://novascotia.ca/nse/ea/docs/EA.Guide-SurfaceCoalMineReclamation.pdf>

Nova Scotia

146. Nova Scotia Environment. 2011. Guide to considering climate change in environmental assessments in Nova Scotia. 20 pp. <https://novascotia.ca/nse/ea/docs/EA.Climate.Change.Guide.pdf>

147. Nova Scotia Environment. 2009. Guide to addressing wildlife species and habitat in an EA registration document. 9 pp. <https://novascotia.ca/nse/ea/docs/EA.Guide-AddressingWildSpecies.pdf>

-
148. Nova Scotia Forestry Division. 2018. Nova Scotia's forest management guide. https://novascotia.ca/natr/forestry/Forest_Review/docs/Forest_Man._Guide_1_v5_.pdf
149. Nova Scotia Department of Natural Resources. 2012. Nova Scotia's Code of Forest Practice: A framework for the implementation of sustainable forest management. www.gov.ns.ca/natr/forestry/strategy/code/NScodeofprac.pdf
150. Nova Scotia Department of Natural Resources. 2011. The path we share, a natural resources strategy for Nova Scotia 2011-2020. 82 pp. https://novascotia.ca/natr/strategy/pdf/Strategy_Strategy.pdf
151. Nova Scotia Environment. 2009. Toward a greener future, Nova Scotia's climate change action plan. 48 pp. https://climatechange.novascotia.ca/sites/default/files/Climate_Change_Action_Plan_2009.pdf
-
152. Department of the Environment, Labour and Justice. 2010. Environmental impact assessment guidelines. 43 pp. https://www.princeedwardisland.ca/sites/default/files/publications/environmental_impact_assessment_guidelines.pdf
- Prince Edward Island 153. Department of Communities, Land and Environment, Forests, Fish and Wildlife Division. 2018. Ecosystem-based forest management standards manual. 60 pp. https://www.princeedwardisland.ca/sites/default/files/publications/2018_eco_manual_technical_version_-_final.pdf
154. Department of Environment, Water and Climate Change. 2018. A climate change action plan for Prince Edward Island 2018-2023. 32 pp. https://www.princeedwardisland.ca/sites/default/files/publications/climatechange2018_f8.pdf
-
155. Department of Natural Resources. 2010. Guidebook to exploration, development and mining in Newfoundland and Labrador. 9 p. <https://www.gov.nl.ca/nr/files/mines-exploration-guidelines-guidebook.pdf>
- Newfoundland and Labrador 156. Department of Environment and Climate Change. 2016. Environmental assessment, a guide to the process. 20 pp. https://www.mae.gov.nl.ca/env_assessment/EA%20Guide%20to%20the%20Process_2016sept.pdf
157. Department of Natural Resources. 2014. Provincial sustainable forest management strategy, growing our renewable and sustainable forest economy 2014-2024. 66 pp. https://www.faa.gov.nl.ca/publications/pdf/psfms_14_24.pdf
158. Municipal Affairs and Environment, Climate Change Branch. 2019. The way forward on climate change in Newfoundland and Labrador. 52 pp. https://www.exec.gov.nl.ca/exec/occ/publications/The_Way_Forward_Climate_Change.pdf
-
159. Aboriginal Affairs and Northern Development Canada and Land and Water Boards of the Mackenzie Valley. 2013. Guidelines for the development of closure and reclamation plans for advanced mineral exploration and mine sites in the Northwest Territories. 88 pp. <https://www.enr.gov.nt.ca/en/content/guidelines-development-closure-and-reclamation-plans-advanced-mineral-exploration-and-mine>
- Northwest Territories 160. Department of Environment and Natural Resources. 2003. Guideline for Contaminated Site Remediation. 39 pp. <https://www.enr.gov.nt.ca/en/content/contaminated-site-remediation-guidelines>
161. Indian and Northern Affairs Canada. 2002. Mine site reclamation policy for the Northwest Territories. 18 pp. <https://www.lands.gov.nt.ca/en/mine-site-reclamation-policy-nwt>
162. Mackenzie Valley Environmental Impact Review Board. 2004. Environmental impact assessment guidelines. 97 pp.
-

http://www.reviewboard.ca/upload/ref_library/MVE%20EIA%20Guidelines_1195078754.pdf

163. Mackenzie Valley Environmental Impact Review Board. 2005. Guidelines for incorporating traditional knowledge in environmental impact assessment. 42 pp. http://www.reviewboard.ca/upload/ref_library/MVReviewBoard_Traditional_Knowledge_Guidelines_1247177561.pdf

164. Department of Environment and Natural Resources. 2005. Commercial timber harvest planning and operations manual. 33 pp. <https://www.enr.gov.nt.ca/node/1459>

165. Department of Environment and Natural Resources. 2019. 2030 NWT climate change strategic framework. 108 pp. <https://www.enr.gov.nt.ca/en/2030-nwt-climate-change-strategic-framework-cadre-strategique-sur-le-changement-climatique-des-tno>

166. Department of Energy, Mines and Resources. 2013. Reclamation and closure planning for quartz mining projects, plan requirements and closure costing guidance. 87 pp.

http://www.emr.gov.yk.ca/mining/pdf/mml_reclamation_closure_planning_quartz_mining_projects_aug2013.pdf

167. Yukon Environmental and Socio-economic Assessment Board. 2010. Proponent's Guide to Project Proposal Submission to a Designated Office. 21 pp.

<https://www.yesab.ca/wp/wp-content/uploads/2018/07/YESAB-Proponents-Guide-Complete-Aug-2010-revised.pdf>

Yukon

168. Yukon Environmental and Socio-economic Assessment Board. 2012. Proponent's guide: Completing a forestry project proposal. 26 pp. <https://www.yesab.ca/wp/wp-content/uploads/2013/04/Completing-a-Forestry-Project-Proposal-PRINT.pdf>

169. Department of Energy, Mines and Resources, Forest Management Branch. 2018. Silviculture strategic plan for Yukon forests. 16 pp.

<https://yukon.ca/sites/yukon.ca/files/emr/emr-silviculture-strategic-plan-yukon-forests.pdf>

170. Climate Change Secretariat. 2019. A Yukon strategy for climate change, energy and a green economy, draft for public review. 61 pp.

<https://yukon.ca/sites/yukon.ca/files/env/env-our-clean-future-draft.pdf>

171. Department of Environment. 2014. Environmental guideline for the management of contaminated sites. 48 pp.

https://www.gov.nu.ca/sites/default/files/contaminated_sites_remediation_2014.pdf

172. Indian and Northern Affairs Canada. 2002. Mine site reclamation policy for Nunavut. 18 pp. https://www.rcaanc-cirnac.gc.ca/DAM/DAM-CIRNAC-RCAANC/DAM-NTHAFF/STAGING/texte-text/recpolnuna_1100100036043_eng.pdf

Nunavut

173. Nunavut Impact Review Board. Administrative and technical guides for public are available from <https://www.nirb.ca/content/guides>

174. Department of Environment. 2011. Upagiaqtavut: climate change impacts and adaptation in Nunavut. 32 pp.

https://www.climatechangenunavut.ca/sites/default/files/3154-315_climate_english_reduced_size_1_0.pdf

175. Parks Canada and the Canadian Parks Council. 2008. Principles and guidelines for ecological restoration in Canada's protected natural areas.

<https://www.pc.gc.ca/en/nature/science/conservation/ie-ei/re-er/pag-pel>

176. Canadian Council of Ministers of the Environment. 2020. Ecological risk assessment guidance document.

[http://www.ccme.ca/files/Resources/csm/ERA%20Guidance%20final-EN%20v1.2%20\(secured\).pdf](http://www.ccme.ca/files/Resources/csm/ERA%20Guidance%20final-EN%20v1.2%20(secured).pdf)

Federal

177. Canadian Council of Forest Ministers. 2010. Framework for forest management offset protocols. https://www.ccfm.org/pdf/FFMOP_e.pdf

178. Natural Resources Canada and Canadian Council of Forest Ministers. 2017. A forest bioeconomy framework for Canada. <https://www.ccfm.org/pdf/10a%20Document%20-%20Forest%20Bioeconomy%20Framework%20for%20Canada%20-%20E.pdf>
179. Forest Stewardship Council Canada. 2019. The FSC® national forest stewardship standard of Canada. <https://ca.fsc.org/download-box.2343.htm>
180. Environment and Climate Change Canada. 2016. Pan-Canadian framework on clean growth and climate change: Canada's plan to address climate and grow the economy. 78 p. http://publications.gc.ca/collections/collection_2017/eccc/En4-294-2016-eng.pdf
181. Canadian Council of Ministers of the Environment. 2019. Pan-Canadian greenhouse gas offsets framework. http://www.ccme.ca/files/Resources/climate_change/Pan-Canadian%20GHG%20Offsets%20Framework%20EN%201.0%20secured.pdf
182. Canadian Council of Forest Ministers. 2015. Climate change and sustainable forest management in Canada: A guidebook for assessing vulnerability and mainstreaming adaptation into decision making. https://www.ccfm.org/pdf/Vulnerability%20Guidebook_June2_EN.pdf
183. Natural Resources Canada. 2021. 2 Billion Trees Commitment. <https://www.canada.ca/en/campaign/2-billion-trees.html>
184. Environment and Climate Change Canada. Nature Smart Climate Solutions Fund. <https://www.canada.ca/en/environment-climate-change/services/environmental-funding/programs/nature-smart-climate-solutions-fund.html>
185. Environment and Climate Change Canada. Indigenous Guardians Pilot. <https://www.canada.ca/en/environment-climate-change/services/environmental-funding/indigenous-guardians-pilot.html>
186. Environment and Climate Change Canada. Environmental Damages Fund. <https://www.canada.ca/en/environment-climate-change/services/environmental-funding/programs/environmental-damages-fund.html>

References

1. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). *The IPBES Assessment Report on Land Degradation and Restoration*; Montanarella, L., Scholes, R., Brainich, A., Eds. Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services: Bonn, Germany; 2018; 744p.
2. Brondizio, E.S.; Settele, J.; Díaz, S.; Ngo, H.T. *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*; IPBES Secretariat: Bonn, Germany, 2019.
3. UN Decade on Ecosystem Restoration. Available online: <https://www.decadeonrestoration.org/> (accessed on 12 August 2022).
4. Choi, Y.D. Restoration ecology to the future: A call for new paradigm. *Restor. Ecol.* **2007**, *15*, 351–353.
5. Stanturf, J.A.; Palik, B.J.; Williams, M.I.; Dumroese, R.K.; Madsen, P. Forest restoration paradigms. *J. Sustain. For.* **2014**, *33* (Suppl. 1), S161–S194
6. Blomley, T., Walters, G. (Eds.) *A Landscape for Everyone: Integrating Rights-Based and Landscape Governance Approaches*; IUCN: Gland, Switzerland, 2019; p. x+86. <https://doi.org/10.2305/IUCN.CH.2019.08.en>
7. Stanturf, J.A.; Kleine, M.; Mansourian, S.; Parrotta, J.; Madsen, P.; Kant, P.; Burns, J.; Bolte, A. Implementing forest landscape restoration under the Bonn challenge: A systematic approach. *Ann. For. Sci.* **2019**, *76*, 50.
8. Gann, G.D.; McDonald, T.; Walder, B.; Aronson, J.; Nelson, C.R.; Jonson, J.; Hallett, J.G.; Eisenberg, C.; Guariguata, M.R.; Liu, J.; et al. International principles and standards for the practice of ecological restoration. *Restor. Ecol.* **2019**, *27* (Suppl. 1), S1–S46.
9. Cohen-Shacham, E.; Walters, G.; Janzen, C.; Maginnis, S. In *Nature-based Solutions to Address global Societal Challenges*; Cohen-Shacham, E., Walters, G., Janzen, C., Maginnis, S., Eds.; The International Union for Conservation of Nature: Gland, Switzerland, 2016; p. xiii+97.
10. Parks Canada and the Canadian Parks Council. 2008. Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas. Available online: <https://www.pc.gc.ca/en/nature/science/conservation/ie-ei/re-ex/pag-pel> (accessed on 12 August 2022).
11. Keenleyside, K.; Dudley, N.; Cairns, S.; Hall, C.; Stolton, S. *Ecological Restoration for Protected Areas: Principles, Guidelines and Best Practices*; IUCN: Gland, Switzerland, 2012; Volume 18.

12. Mansuy, N.; Burton, P.J.; Stanturf, J.; Beatty, C.; Mooney, C.; Besseau, P.; Degenhardt, D.; MacAfee, K.; Lapointe, R. Scaling up forest landscape restoration in Canada in an era of cumulative effects and climate change. *For. Policy Econ.* **2020**, *116*, 102177.
13. Tarnocai, C. The effect of climate change on carbon in Canadian peatlands. *Glob. Planet. Change* **2006**, *53*, 222–232.
14. Oberle, B.; Bringezu, S.; Hatfield-Dodds, S.; Hellweg, S.; Schandl, H.; Clement, J.; Cabernard, L.; Che, N.; Chen, D.; Droz-Georget, H.; et al. *Global Resources Outlook 2019: Natural Resources for the Future We Want*; Nairobi, Kenya, 2019.
15. Natural Resources Canada (NRCan). 2019. Energy and the Economy. Available online: <https://www.nrcan.gc.ca/science-data/data-analysis/energy-data-analysis/energy-facts/energy-and-economy/20062> (accessed on 12 August 2022).
16. Boyd, D.R. *Unnatural Law: Rethinking Canadian Environmental Law and Policy*; UBC Press, Vancouver, BC, Canada, 2014.
17. Venier, L.A.; Thompson, I.D.; Fleming, R.; Malcolm, J.; Aubin, I.; Trofymow, J.A.; Langor, D.; Sturrock, R.; Patry, C.; Outerbridge, R.O.; et al. Effects of natural resource development on the terrestrial biodiversity of Canadian boreal forests. *Environ. Rev.* **2014**, *22*, 457–490.
18. MacKinnon, D.; Lemieux, C.J.; Beazley, K.; Woodley, S.; Helie, R.; Perron, J.; Elliott, J.; Haas, C.; Langlois, J.; Lazaruk, H.; et al. Canada and Aichi Biodiversity Target 11: Understanding ‘other effective area-based conservation measures’ in the context of the broader target. *Biodivers. Conserv.* **2015**, *24*, 559–3581.
19. Shackelford, N.; Standish, R.J.; Ripple, W.; Starzomski, B.M. Threats to biodiversity from cumulative human impacts in one of North America’s last wildlife frontiers. *Conserv. Biol.* **2018**, *32*, 672–684.
20. Gauthier, S.; Bernier, P.; Kuuluvainen, T.; Shvidenko, A.Z.; Schepaschenko, D.G. Boreal forest health and global change. *Science* **2015**, *349*, 819–822.
21. Boulanger, Y.; Taylor, A.R.; Price, D.T.; Cyr, D.; McGarrigle, E.; Rammer, W.; Sainte-Marie, G.; Beaudoin, A.; Guindon, L.; Mansuy, N. Climate change impacts on forest landscapes along the Canadian southern boreal forest transition zone. *Landsc. Ecol.* **2017**, *32*, 1415–1431.
22. Boucher, D.; Boulanger, Y.; Aubin, I.; Bernier, P.Y.; Beaudoin, A.; Guindon, L.; Gauthier, S. Current and projected cumulative impacts of fire, drought, and insects on timber volumes across Canada. *Ecol. Appl.* **2018**, *28*, 1245–1259.
23. Furgal, C.; Seguin, J. Climate change, health, and vulnerability in Canadian northern Aboriginal communities. *Environ. Health Perspect.* **2006**, *114*, 1964–1970.
24. Duinker, P.N.; Greig, L.A. The impotence of cumulative effects assessment in Canada: Ailments and ideas for redeployment. *Environ. Manag.* **2006**, *37*, 153–161.
25. Antwi, E.K.; Boaky-Danquah, J.; Owusu-Banahene, W.; Webster, K.; Dabros, A.; Wiebe, P.; Mayor, S.J.; Westwood, A.; Mansuy, N.; Setiawati, M.D.; et al. A Global review of cumulative effects assessments of disturbances on forest ecosystems. *J. Environ. Manag.* **2022**, *317*, 115277.
26. Burton, A.C.; Huggard, D.; Bayne, E.; Schieck, J.; Sólymos, P.; Muhly, T.; Farr, D.; Boutin, S.A. Framework for adaptive monitoring of the cumulative effects of human footprint on biodiversity. *Environ. Monit. Assess.* **2014**, *186*, 3605–3617.
27. Kishchuk, B.E.; Creed, I.F.; Laurent, K.L.; Nebel, S.; Kreutzweiser, D.; Venier, L.; Webster, K. Assessing the ecological sustainability of a forest management system using the ISO Bowtie Risk Management Assessment Tool. *For. Chron.* **2018**, *94*, 25–34.
28. Shackelford, N.; Hobbs, R.J.; Burgar, J.M.; Erickson, T.E.; Fontaine, J.B.; Laliberté, E.; Ramalho, C.E.; Perring, M.P.; Standish, R.J. Primed for change: Developing ecological restoration for the 21st century. *Restor. Ecol.* **2013**, *21*, 297–304.
29. Hassel, A. Public policy. In *International Encyclopedia of the Social and Behavioral Sciences*, 2nd ed.; Elsevier: Amsterdam, The Netherlands, 2015; pp. 569–575.
30. Cliquet, A.; Decler, K. Linking Restoration Science and Law. In *Ecological Restoration Law: Concepts and Case Studies*; Richardson, B., Akhtar-Khavari, A. Eds.; Routledge: London, UK, 2019.
31. Environment and Climate Change Canada (ECCC). 2021. Nature Smart Climate Solutions Fund. Available online: <https://www.canada.ca/en/environment-climate-change/services/environmental-funding/programs/nature-smart-climate-solutions-fund.html> (accessed on 1 March 2022).
32. Government of Canada. 2021. 2030 Emissions Reduction Plan: Clean Air, Strong Economy. Available online: <https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html> (accessed on 12 August 2022).
33. Paterson, T. *History of the Canadian Land Reclamation Association*; Canadian Reclamation; Aquila Publishing: Edmonton, AB, Canada, 2006.
34. Powter, C.; Chymko, N.; Dinwoodie, G.; Howat, D.; Janz, A.; Puhlmann, R.; Richens, T.; Watson, D.; Sinton, H.; Ball, K.; et al. Regulatory history of Alberta’s industrial land conservation and reclamation program. *Can. J. Soil Sci.* **2012**, *92*, 39–51.
35. The Montréal Process, 1994. Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests. Available online: <https://montreal-process.org/Resources/Publications/index.shtml>.
36. Natural Resources Canada (NRCan). The state of Canada’s Forests. In *Annual Report 2020*; Natural Resources Canada, Canadian Forest Service: Ottawa, ON, Canada, 2020.
37. Government of Canada. 2019. Basics of Environmental Assessment. Available online: <https://www.canada.ca/en/impact-assessment-agency/services/environmental-assessments/basics-environmental-assessment.html#ceaa03> (accessed on 1 March 2022).
38. Government of Canada. 2022. Indigenous Guardians Pilot. Available online: <https://www.canada.ca/en/environment-climate-change/services/environmental-funding/indigenous-guardians-pilot.html> (accessed on 1 March 2022).
39. Government of Canada. 2019. Species at Risk Act: Description. Available online: <https://www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding/act-description.html> (accessed on 1 March 2022).

40. Flucker, S.; Stacey, J. The basics of species at risk legislation in Alberta. *Alta. Law Rev.* **2012**, *50*, 95–114.
41. Kauffman, R. *Habitat Law in Alberta, Volume 1: The State of Habitat Laws in Alberta*; Environmental Law Centre (Alberta) Society: Edmonton, Alberta, 2019.
42. COSEWIC. *Assessment and Update Status Report on the Woodland Caribou, Rangifer Tarandus Caribou, in Canada Committee on the Status of Endangered Wildlife in Canada*; Environment Canada: Ottawa, ON, Canada, 2002.
43. Environment and Climate Change Canada (ECCC). *Progress Report on Unprotected Critical Habitat for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada*; Species at Risk Act Critical Habitat Report Series; Environment and Climate Change Canada: Ottawa, ON, Canada, 2018; p. 19.
44. Environment and Climate Change Canada (ECCC). *Action Plan for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada-Federal Actions [Proposed]*; Species at Risk Act Action Plan Series; Environment and Climate Change Canada: Ottawa, ON, Canada, 2017; p. vii+24.
45. Government of Canada. 2022b. 2 Billion Trees Program. Available online: <https://www.canada.ca/en/campaign/2-billion-trees/2-billion-trees-program.html> (accessed on 1 March 2022)
46. Baker, S.; Eckerberg, K. A policy analysis perspective on ecological restoration. *Ecol. Soc.* **2013**, *18*, 17.
47. Baker, S.; Eckerberg, K.; Zachrisson, A. Political science and ecological restoration. *Environ. Politics* **2014**, *23*, 509–524.
48. Chazdon, R.L.; Brancalion PH, S.; Lamb, D.; Laestadius, L.; Calmon, M.; Kumar, C. A policy-driven knowledge agenda for global forest and landscape restoration. *Conserv. Lett.* **2017**, *10*, 125–132.
49. Mansourian, S. Understanding the relationship between governance and forest landscape restoration. *Conserv. Soc.* **2016**, *14*, 267–278.
50. Akhtar-Khavari, A., Richardson, B.J. (Eds.) *Ecological Restoration Law: Concepts and Case Studies*; Routledge: London, UK, 2019.
51. Moore, J.W.; Nowlan, L.; Olszynski, M.; Jacob, A.L.; Favaro, B.; Collins, L.; Williams-Davidson, G.T.L.; Weitz, J. Towards linking environmental law and science. *FACETS* **2018**, *3*, 375–391.
52. Zedler, J.B.; Doherty, J.M.; Miller, N.A. Shifting restoration policy to address landscape change, novel ecosystems, and monitoring. *Ecol. Soc.* **2012**, *17*.
53. Fagan, M.E.; Reid, J.L.; Holland, M.B.; Drew, J.G.; Zahawi, R.A. How feasible are global forest restoration commitments? *Conserv. Lett.* **2020**, *13*, e12700.
54. Mansourian, S.; Walters, G.; Gonzales, E. Identifying governance problems and solutions for forest landscape restoration in protected area landscapes. *Parks* **2019**, *25*, 83–96.
55. Diefenderfer, H.L.; Steyer, G.D.; Harwell, M.C.; LoSchiavo, A.J.; Neckles, H.A.; Burdick, D.M.; Johnson, G.E.; Buenau, K.E.; Trujillo, E.; Callaway, J.C.; et al. Applying cumulative effects to strategically advance large-scale ecosystem restoration. *Front. Ecol. Environ.* **2021**, *19*, 108–117.
56. Lindenmayer, D. Improving restoration programs through greater connection with ecological theory and better monitoring. *Front. Ecol. Environ.* **2020**, *8*, 50.
57. Campbell, A.; Alexandra, J.; Curtis, D. Reflections on four decades of land restoration in Australia. *Rangel. J.* **2017**, *39*, 405–416.
58. Schultz, C.A.; Jedd, T.; Beam, R.D. The Collaborative Forest Landscape Restoration Program: A history and overview of the first projects. *J. For.* **2012**, *110*, 381–391.
59. Higgs, E. *Human Dimensions of Ecological Restoration: Integrating Science, Nature, and Culture*; Island Press: Washington, DC, USA, 2012.
60. Hobbs, R.J.; Higgs, E.; Harris, J.A. Novel ecosystems: Implications for conservation and restoration. *Trends Ecol. Evol.* **2009**, *24*, 599–605.
61. Hobbs, R.J.; Higgs, E.; Hall, C. *Novel Ecosystems: Intervening in the New Ecological World Order*; John Wiley & Sons: Hoboken, NJ, USA, 2013.
62. Higgs, E. Novel and designed ecosystems. *Restor. Ecol.* **2017**, *25*, 8–13.
63. Kattan, G.H.; Aronson, J.; Murcia, C. Does the novel ecosystem concept provide a framework for practical applications and a path forward? *Restor. Ecol.* **2016**, *24*, 714–716.
64. Miller, J.R.; Bestelmeyer, B.T. What’s wrong with novel ecosystems, really? *Restor. Ecol.* **2016**, *24*, 577–582.
65. Aronson, J.; Goodwin, N.; Orlando, L.; Eisenberg, C.; Cross, A.T. A world of possibilities: Six restoration strategies to support the United Nation’s Decade on Ecosystem Restoration. *Restor. Ecol.* **2020**, *28*, 730–736.
66. Higgs, E.; Harris, J.; Murphy, S.; Bowers, K.; Hobbs, R.; Jenkins, W.; Kidwell, J.; Lopoukhine, N.; Sollereeder, B.; Suding, K.; et al. On principles and standards in ecological restoration. *Restor. Ecol.* **2018**, *26*, 399–403.
67. FAO; IUCN; CEM; SER. Global Capacity Needs Assessment. Key Gaps and Capacity Priorities for Restoration to Support the United Nations Decade on Ecosystem Restoration 2021–2030. 2021. <https://www.fao.org/3/cb8019en/cb8019en.pdf> (accessed on 1 June 2022).
68. Voicescu, S.A.; Lane, J.F.; Cooke, S.J.; Higgs, E.; Fisher, A.C.; Rochefort, L.; Shackelford, N.; Murphy, S. Awareness and Use of SER’s International Principles and Standards for the Practice of Ecological Restoration in Canada. *Restor. Ecol.* **2022**, e13789.
69. Powder, C.; Dixon, R.J.; Mansuy, N. Estimating the Size of the Reclamation and Restoration Economy and Supply Chain in Alberta. Information Report NOR-X-42. 2021. 93 p. Available online: <https://cfs.nrcan.gc.ca/publications?id=40466> (accessed on 1 March 2022).
70. Certification Canada. 2022. Forest Management Certification in Canada. Available online: <http://www.certificationcanada.org/en/home/> (accessed on 1 June 2022).

71. Dyk, A.; Leckie, D.; Tinis, S.; Ortlepp, S. *Canada's National Deforestation Monitoring System: System Description*. *Natural Resources Canada*; Information Report BC-X-439; Canadian Forest Service, Pacific Forestry Centre: Victoria, BC, Canada, 2015; p. 30
72. MacLean, J. Striking at the root problem of Canadian environmental law: Identifying and escaping regulatory capture. *J. Environ. Law Pract.* **2016**, *29*, 111.
73. Wellstead, A.; Rayner, J.; Howlett, M. Alberta's oil sands reclamation policy trajectory: The role of tense layering, policy stretching, and policy patching in long-term policy dynamics. *J. Environ. Plan. Manag.* **2016**, *59*, 1873–1890.
74. Hebblewhite, M. Billion-dollar boreal woodland caribou and the biodiversity impacts of the global oil and gas industry. *Biol. Conserv.* **2017**, *206*, 102–111.
75. Bentham, P.; Coupal, B. Habitat restoration as a key conservation lever for woodland caribou: A review of restoration programs and key learnings from Alberta. *Rangifer* **2015**, *35*, 123–147.
76. Liefvers, V.J.; Pinno, B.D.; Beverly, J.L.; Thomas, B.R.; Nock, C. Reforestation policy has constrained options for managing risks on public forests. *Can. J. For. Res.* **2020**, *50*, 855–861.
77. Waring, K.; Bradford, J.; Looney, C. Forests on the edge: Forest ecology in rapidly changing conditions. *Can. J. For. Res.* **2020**, *50*, v–vi.
78. Dawson, N.; Coolsaet, B.; Sterling, E.; Loveridge, R.; Nicole, D.; Wongbusarakum, S.; Sangha, K.; Scherl, L.; Phan, H.P.; Zafra-Calvo, N.; et al. The role of Indigenous peoples and local communities in effective and equitable conservation. *Ecol. Soc.* **2021**, *26*. <https://doi.org/10.5751/ES-12625-260319>
79. Zurba, M.; Beazley, K.F.; English, E.; Buchmann-Duck, J. Indigenous protected and conserved areas (IPCAs), Aichi Target 11 and Canada's Pathway to Target 1: Focusing conservation on reconciliation. *Land* **2019**, *8*, 10.
80. Hein, L.; Bagstad, K.J.; Obst, C.; Edens, B.; Schenau, S.; Castillo, G.; Souldard, F.; Brown, C.; Driver, A.; Bordt, M.; et al. Progress in natural capital accounting for ecosystems. *Science* **2020**, *367*, 514–515.
81. Drever, C.R.; Cook-Patton, S.C.; Akhter, F.; Badiou, P.H.; Chmura, G.L.; Davidson, S.J.; Desjardins, R.L.; Dyk, A.; Fargione, J.E.; Fellows, M.; et al. Natural climate solutions for Canada. *Sci. Adv.* **2021**, *7*, eabd6034.
82. Agarwala, M.; Atkinson, G.; Baldock, C.; Gardiner, B. Natural capital accounting and climate change. *Nat. Clim. Change* **2014**, *4*, 520–522.
83. Audet, P.; Pinno, B.D.; Thiffault, E. Reclamation of boreal forest after oil sands mining: Anticipating novel challenges in novel environments. *Can. J. For. Res.* **2015**, *45*, 364–371.
84. Higgs, E.S.; Harris, J.A.; Heger, T.; Hobbs, R.J.; Murphy, S.D.; Suding, K.N. Keep ecological restoration open and flexible. *Nat. Ecol. Evol.* **2018b**, *2*, 580–580.
85. EcoCanada, 2014. Careers in Site Assessment and Reclamation. Available online: <https://eco.ca/new-reports/careers-site-assessment-and-reclamation/> (accessed on 1 June 2022).
86. Mansuy, N. Stimulating post-COVID-19 green recovery by investing in ecological restoration. *Restor. Ecol.* **2020**, *28*, 1343–1347.
87. Mansuy, N.; MacAfee, K. More than planting trees: Career opportunities in ecological restoration. *Front. Ecol. Environ.* **2019**, *17*, 355–335.