

Policy and Planning for Coastal Ecosystems in British Columbia through a Blue Carbon Lens

A nature-based approach to climate action and resilience

November 2020 | Deborah Carlson, Staff Lawyer



Acknowledgments

West Coast Environmental Law and the author gratefully acknowledge the contributions of Maija Gailis, Mitacs researcher with West Coast in 2019, as well as West Coast staff lawyers Linda Nowlan, Stephanie Hewson, Jessica Clogg, Georgia Lloyd-Smith and Michael Bissonnette, and communications specialists Alexis Stoymenoff and Julia Kidder. We would also like to acknowledge the helpful and generous sharing of information by scientists Dr. Karen Kohfeld, Dr. Marlow Pellatt, and Matt Christensen.

West Coast's work is funded by:



This report was also funded in part by the Gordon and Betty Moore Foundation.

© West Coast Environmental Law, 2020
#700-509 Richards St., Vancouver, BC, V6B 2Z6
www.wcel.org | admin@wcel.org

Cover photo: Gord McKenna via Flickr Creative Commons

Table of Contents

Introduction	4
Background on blue carbon and coastal ecosystems	5
Accounting for blue carbon in coastal ecosystems	6
Blue carbon accounting in international law and in other countries	7
Blue carbon accounting: the science	7
Blue carbon accounting in Canada	8
Policy and planning for coastal ecosystems in BC – where does blue carbon fit in?	10
BC provincial laws	12
1) <i>Land Act, Land Title Act</i> – Provincial Crown aquatic lands.....	12
2) <i>BC Wildlife Act</i> – Wildlife Management Areas	14
3) <i>BC Park Act, Protected Areas of British Columbia Act, Ecological Reserve Act, Environment and Land Use Act</i>	15
4) <i>BC Environmental Assessment Act</i>	17
Federal laws.....	20
1) Federally protected areas – <i>Canada National Parks Act, Canada National Marine Conservation Areas Act, Oceans Act, Migratory Birds Convention Act, and Canada Wildlife Act</i>	20
2) <i>Federal Impact Assessment Act</i>	25
3) <i>Federal Fisheries Act</i>	27
4) Federal lands owned and managed by the Vancouver Fraser Port Authority – <i>Canada Marine Act</i>	29
Indigenous law and jurisdiction.....	31
Local government regulation	34
Local government – <i>Local Government Act, Community Charter, Dike Maintenance Act</i>	34
Carbon offsets and blue carbon	38
Key findings and recommendations	40

Discussion paper:

Policy and Planning for Coastal Ecosystems in British Columbia (and Canada) through a Blue Carbon Lens – *A nature-based approach to climate change*

Introduction

Healthy coastal ecosystems are essential for maintaining biodiversity and liveable coastal communities, providing critical habitat, water quality protection, food and medicinal plants for harvesting, lessening of coastal erosion, resilience to climate change, and flood regulation. Perhaps less well known is that coastal ecosystems also play an important role in long-term carbon storage and sequestration. This paper looks at emerging policy opportunities and needs in Canada, and specifically British Columbia, for “blue carbon” – the carbon stored in vegetated coastal ecosystems – and how protecting blue carbon as a climate action measure aligns with coastal biodiversity protection and resilience more broadly.

Managing blue carbon requires a strong knowledge base, grounded in an accurate inventory of coastal ecosystems and their health that is the foundation for coastal ecosystem management generally. As discussed below, information about coastal ecosystems in Canada, including their extent, composition, and vulnerability to a range of stressors, is less than complete.¹ With respect to blue carbon, specifically, BC and Canada have some work to do to connect resources and data from ongoing and past research initiatives, and address gaps. We can benefit from activities in other jurisdictions. Frameworks already exist for blue carbon accounting including Intergovernmental Panel on Climate Change guidance and methodologies, and there are lessons from its practical application in other coastal countries around the world, including the United States and Australia.

In BC, looking at law and policy for coastal regions through a blue carbon lens also highlights a lack of ecosystem-based management approaches and general fragmentation in planning and policy at the provincial level. This in turn suggests that coastal ecosystems and their rich biodiversity are vulnerable to further degradation and loss, from human activities as well as new climate change stressors. Overall, the need for more holistic and coordinated management backed up by legal protection for coastal ecosystems is clear. BC’s coasts are subject to non-Indigenous (federal and provincial/local) and Indigenous jurisdiction that will require ongoing government-to-government negotiations and arrangements. At the same time, BC has a responsibility to get its own house in order and develop coherent and coordinated regulatory approaches to coastal management so that it can be a credible partner in coastal ecosystem and biodiversity protection.

Maintaining and increasing blue carbon storage through ecosystem-based management is directly linked to biodiversity protection in coastal and marine regions, and it is a nature-based, multiple-benefit approach to climate mitigation and adaptation that deserves more attention and action in BC and Canada.²

¹ Watson, Maryann. *BC Coastal Habitat Review*, (2020). Prepared for West Coast Environmental Law Research Foundation, online: https://www.wcel.org/sites/default/files/publications/bc-coastal-habitat-review_final_2020.pdf

² This discussion paper was developed to accompany the Technical Brief: Quantifying blue carbon in salt marshes in south coast BC, which describes research on blue carbon in Boundary Bay, BC, prepared by SFU graduate student Maija Gailis working in the Climate, Oceans and Paleo-Environments Lab at the School of Resource and Environmental Management, Simon Fraser University under the supervision of Dr. Karen Kohfeld. Ms. Gailis’ research and analysis was funded in part through a Mitacs partnership grant with West Coast Environmental Law Association. Mitacs is a national, not-for-profit organization that delivers research and training programs by helping to fund applied research in partnership with non-academic organizations. See mitacs.ca

Background on blue carbon and coastal ecosystems

Coastal wetlands (salt marshes, seagrass meadows, and mangroves) and kelp forests provide a range of ecosystem services that can help in management of coastal erosion, flooding, and climate change adaptation through shoreline stabilization, wave attenuation, and storm surge and flood protection.³ Coastal ecosystems are also now being recognized as natural and efficient carbon sinks that capture atmospheric CO₂ and store carbon.⁴ ‘Blue carbon’ is the term coined to describe carbon stored in this way.⁵

Loss of coastal wetlands: Historic degradation and new threats from sea level rise

Worldwide, coastal ecosystems are threatened by continuing losses from human development, as well as future sea level rise. More than 50% of coastal wetlands were lost globally in the 20th century, with the rate of loss accelerating over past decades.⁶ In the Lower Mainland of British Columbia, it is estimated that 70% of tidal wetlands have already been lost through a “thousand cuts” of urban and agricultural development and industrialization in the colonial period.⁷ The remaining salt marsh areas of coastal BC have been approximated at around 6,000 ha.⁸ On the east coast, the Government of Nova Scotia estimates that, since the 1700s, 80% of the salt marshes in the Bay of Fundy, and 50% of salt marshes province-wide have been lost, mainly due to diking.⁹ Even so, a provincial wetland inventory estimated there are 17,060 ha of salt marsh remaining.¹⁰ In New Brunswick, data from a wetland inventory suggests that there may be 22,000 ha of coastal wetlands in the Bay of Fundy in that province.¹¹ What remains of Canada’s vegetated coastal ecosystems still support rich biodiversity (millions of migratory birds, salmon and other species) and their protection and recovery over the long term needs to be addressed.¹²

³ S. Temmerman, P. Meire, T. Bouma, et al, “Ecosystem-based coastal defence in the face of global change” (2013) *Nature* 504, 79 doi:10.1038/nature12859; W.R. Moomaw, G.L. Chmura, G.T. Davies, et al, “Wetlands in a changing climate: science, policy and management” (2018) *Wetlands* 38:183. <https://doi.org/10.1007/s13157-018-1023-8>; H. Teagle et al, “The role of kelp species as biogenic habitat formers in coastal marine ecosystems” (2017). *J. Exp. Mar. Bio. Ecol.* 492, 81 online: <https://doi.org/10.1016/j.jembe.2017.01.017> see also Krista Forsynski, *Nature-based Flood Protection: The Contribution of Tidal Marsh Vegetation to Wave Attenuation at Sturgeon Bank* (M.Sc., School of Resources, Environment and Sustainability, University of British Columbia, 2019) [unpublished].

⁴ G.L. Chmura, S.C. Anisfield, D.R. Cahoon and J.C. Lynch, “Global carbon sequestration in tidal, saline wetland soils” (2003) *Global Biochem Cy* 17:1111, online: https://www.researchgate.net/publication/228736624_Global_carbon_sequestration_in_tidal_saline_wetland_soils; C.M. Duarte, I.J. Losada, I.E. Hendriks, I. Mazarrasa, and N. Marba, “The role of coastal plant communities for climate change mitigation and adaptation” (2013) *Nature Climate Change* 3:961, online: <https://www.nature.com/articles/nclimate1970>

⁵ C. Nellemann, E. Corcoran, CM Duarte, et al (eds.), *Blue carbon: A rapid response assessment* (2009). GRID-Arenthal: United Nations Environment Programme.

⁶ X. Li, R. Bellerby, C. Craft, and S.E. Widney, “Coastal wetland loss, consequences and challenges for restoration” (2018) *Anthropocene Coasts*, 1(1):1 <https://doi.org/10.1139/anc-2017-0001>

⁷ Government of BC, Government of Canada, *Fraser River Estuary Study Summary* (1978) online: <https://www.for.gov.bc.ca/hfd/library/documents/Bib68894.pdf>

⁸ J.L. Ryder, J.K. Kenyon, D. Buffett, et al, *An Integrated Biophysical Assessment of Estuarine Habitats in British Columbia to Assist in Regional Conservation Planning* (2007). Canadian Wildlife Service, Pacific and Yukon Region, Technical Report Series Number 476.

⁹ Government of Nova Scotia, “Historic Wetland Loss in Nova Scotia”, online: <https://novascotia.ca/nse/wetland/historic-wetland-loss-ns.asp>

¹⁰ Government of Nova Scotia, “Nova Scotia’s Wetlands”, online: <https://novascotia.ca/nse/wetland/>

¹¹ P. Murphy, J. Ogilvie, K. Connor and P. Arp, “Mapping wetlands: a comparison of two approaches for New Brunswick, Canada” (2007) *Wetlands* 27(4):846, online:

https://www.researchgate.net/publication/225525723_Mapping_wetlands_A_comparison_of_two_different_approaches_for_New_Brunswick_Canada

¹² BC Ministry of Environment. *Estuaries in British Columbia* (2006), online: https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/species-ecosystems-at-risk/brochures/estuaries_bc.pdf

Climate change now threatens coastal ecosystems, through sea level rise and warming ocean temperatures. At the same time we are learning about their role in helping to capture and store carbon. In some areas, with an adequate sediment supply, coastal marshes have been shown to increase in vertical elevation over time, and they may be able to keep up with lower rates of sea level rise.¹³ Alternatively, salt marshes could migrate landwards to higher elevations as those areas become tidal waters. However, salt marshes along coastlines that have been hard armoured with dikes, sea walls and other structures, which is often the case in developed regions, will not be able to migrate landward, meaning that permanent inundation and loss is a distinct possibility. In the case of kelp forests, emerging research shows that kelp is vulnerable to higher ocean temperatures. This compounds the impacts of existing stressors, such as overfishing, which means fewer fish to eat organisms that eat kelp, and clear-cutting terrestrial forests, which introduces extra soil into coastal waters and prevents kelp from getting the sunlight it needs for photosynthesis.¹⁴

Deeper understanding and monitoring of these ecosystems is urgent, so that we can develop effective policies and plans to protect them. A blue carbon lens is a reminder of the many ways that we depend on healthy marine and coastal ecosystems, and their often unseen and unappreciated activities.



Photo: Seagrass at Mud Bay, BC (Maija Gailis)

¹³ See M. Schuerch, T. Spencer, S. Temmerman, M. Kirwan, C. Wolff, D. Lincke, C. Mcowen, M. Pickering, R. Reef, A. Vafeidis, J. Hinkel, R. Nicholls, and S. Brown, "Future response of global coastal wetlands to sea-level rise" (2018) *Nature* 561. 10.1038/s41586-018-0476-5. On the west coast of BC, a research initiative coordinated through Nature Trust BC with provincial and federal funding is looking at assessing the climate resilience of tidal wetlands in estuaries at 15 locations, using the Marsh Resilience to Sea Level Rise (MARS) tool developed by the U.S. National Estuarine Research Reserve Association. See <https://www.naturetrust.bc.ca/our-projects/enhancing-bc-estuaries>

¹⁴ S. Schroeder *et al*, "Spatial and temporal persistence of nearshore kelp beds on the west coast of British Columbia, Canada using satellite remote sensing" (2019) *Remote Sensing in Ecology and Conservation* online: <https://doi.org/10.1002/rse2.142>

Accounting for blue carbon in coastal ecosystems

A foundation for managing blue carbon in coastal ecosystems is carbon accounting – determining how much carbon is stored in soils and coastal vegetation (algae, in the case of kelp), and the net rates of sequestration or loss. The results of carbon accounting can then be used to inform policy and planning about protecting and increasing carbon stocks and rates of accumulation, and reducing losses.

Blue carbon accounting in international law and in other countries

Blue carbon accounting is far from a novel concept. In international climate law the management of blue carbon is supported by Article 4.1(d) of the United Nations Framework Convention on Climate Change, (described as sinks and reservoirs of carbon in coastal and marine ecosystems)¹⁵, and the Intergovernmental Panel on Climate Change (IPCC) has developed methodologies.¹⁶ The United States first included managed coastal wetlands in its 2017 national GHG inventory.¹⁷ Australia has led an international initiative to advance blue carbon research and policy development.¹⁸ A 2016 survey found that following the Paris Agreement, 28 of the signatories had included reference to coastal wetlands in mitigation action, and 59 countries included coastal ecosystems in their adaptation strategies.¹⁹ It has been suggested that there will likely be further action to include blue carbon in national plans to implement climate policy and management, given the “high potential of Blue Carbon to offer triple value benefits in adaptation, mitigation and resilience.”²⁰ At the subnational level, in California, a recent Executive Order directs state agencies to take action to accelerate carbon storage and climate resilience in natural ecosystems, including coastal wetlands.²¹

Blue carbon accounting: the science

Blue carbon accounting is underway in other coastal countries, and the science supporting it continues to evolve and be refined. At a basic level, carbon accounting for coastal ecosystems involves determining the spatial extent (area) of coastal ecosystems and then calculating the net flux of carbon for a given area (how much carbon is stored and released).²²

¹⁵ See Dorothee, *et al*, “Coastal blue carbon and Article 6: Implications and Opportunities” (2018) The Netherlands: Climate Focus. Online at: https://climatefocus.com/sites/default/files/20181203_Article%206%20and%20Coastal%20Blue%20Carbon.pdf

¹⁶ T. Hiraishi, T. Krug, K. Tanabe, N. Srivastava, B. Jamsranjav, M. Fukuda, and T. Troxler, T. (eds.) *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement)*, (2013) online: https://www.ipcc-nggip.iges.or.jp/public/wetlands/pdf/Wetlands_separate_files/WS_Cover_Foreword.pdf

¹⁷ S. Crooks, A.E. Sutton-Grier, T.G. Troxler, N. Herold, B. Bernal, L. Schile-Beers, & T. Wirth, “Coastal wetland management as a contribution to the US National Greenhouse Gas Inventory” (2018) *Nature Climate Change* 8:1109. While they referred to “managed lands”, in fact the US included all coastal wetlands for the contiguous US in the inventory.

¹⁸ See “International Partnership for Blue Carbon”, online at: <https://www.environment.gov.au/climate-change/government/international/blue-carbon>

¹⁹ Herr, *op. cit.* Figure 3.

²⁰ Catherine Martine, *Understanding Blue Carbon Requests in the NDC Partnership* (2019), online: NDC Partnership <http://ndcpartnership.org/news/understanding-blue-carbon-requests-ndc-partnership>

²¹ Cal. Exec. Order N-82-20 (October 7, 2020), online: <https://www.gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20-.pdf> The Order directs state agencies to prepare an overarching Natural and Working Lands Climate Smart Strategy, and recognizes the intersection of environmental, social and economic challenges related to climate change and biodiversity loss.

²² J.R. Holmquist, L. Windham-Myers, B. Bernal, K. Byrd, S. Crooks, M. Eagle Gonnee, N. Herold, S. Knox, K. Kroeger, J. McCombs, J. P. Megonigal, M. Lu, J. Morris, A. Sutton-Grier, T. Troxler and D. Weller, “Uncertainty in United States coastal wetland greenhouse gas inventories” (2018) *Environmental Research Letters* 13:115005, online: <https://pubs.er.usgs.gov/publication/70204265>

Determining the rate that carbon is being lost or stored, and how, is the focus of most of the current blue carbon research.²³ There is also research being done to understand the carbon stocks, i.e. the carbon already stored, in existing coastal ecosystems. However, as detailed analysis from the United States demonstrates, while uncertainties remain, it is possible to move forward with high level estimates and also to obtain more refined data for specific locations, if resources are applied to research activities and related projects.²⁴ A recent synthesis of research questions provided by leading blue carbon scientists from around the world established a roadmap for future inquiry, but also noted that:

Despite [...] barriers, we now have the fundamental knowledge to justify the inclusion of BC [blue carbon] protection, restoration and creation in C [carbon] mitigation mechanisms. While there remain knowledge gaps—both in science, policy and governance—these will partly be addressed through the effective demonstration, monitoring and reporting of existing and new BC [blue carbon] projects.²⁵

Blue carbon accounting in Canada

Blue carbon as a carbon sink or source is only beginning to be recognized in Canada in greenhouse gas accounting policies. The 2020 federal *Strategic Assessment of Climate Change* includes “oceans” as carbon sinks.²⁶ However, to date there is no federal or provincial statute or regulation that explicitly addresses blue carbon as a greenhouse gas source or sink, and it is not included in Canada’s national or provincial GHG inventories.²⁷

Canada also lacks a national inventory of coastal wetlands, and kelp forests, that could support a country-wide assessment of blue carbon, even at a high level. Provincial data for British Columbia, New Brunswick and Quebec also does not appear to be up to date or complete. Nova Scotia offers accessible statistics about the extent of its salt marshes, although it is not clear if detailed information about location and type and other details relevant to blue carbon accounting is available.²⁸

On the other hand, there is a new but growing body of research assessing blue carbon stocks and rates of carbon sequestration, on both east and west coasts of Canada, as well as a significant body of work from around the world to draw on. In Canada, blue carbon has been assessed for both protected and restored coastal ecosystems.²⁹ There are blue carbon research initiatives completed or underway at Simon Fraser

²³ P. I. Macreadie, *et al*, “The future of Blue Carbon science” (2019) *Nature communications* 10:3998, online: <https://doi.org/10.1038/s41467-019-11693-w>

²⁴ L. Windham-Myers, W.-J. Cai, S.R. Alin, A. Andersson, J. Crosswell, K.H. Dunton *et al*, Chapter 15: Tidal wetlands and estuaries. In *Second State of the Carbon Cycle Report (SOCCR2): A Sustained Assessment Report* [N. Cavallero *et al* (eds.) U.S. Global Change Research Program, Washington DC, 596, online: <https://doi.org/10.7930/SOCCR2.2018.Ch15>

²⁵ Macreadie, *op. cit.* at 9.

²⁶ Government of Canada, *Strategic Assessment of Climate Change* (2020) online: <https://www.strategicassessmentclimatechange.ca/15112/widgets/61020/documents/36886>

²⁷ BC includes ‘wetland management’ as a ‘memo item’ in its greenhouse gas inventory, but this does not include coastal wetlands. See Government of British Columbia, *Methodology Book for the Greenhouse Gas Inventory of British Columbia* (June, 2019), online: https://www2.gov.bc.ca/assets/gov/environment/climate-change/data/provincial-inventory/bc-methodology-book_ghg-provincial-inventory.pdf

²⁸ See notes 6-9.

²⁹ For example, V.R. Postlewaite, A.E. McGowan, K.E. Kohfeld, C.L.K. Robinson, and M.G. Pellatt, “Low blue carbon storage in eelgrass (*Zostera Marina*) meadows on the Pacific Coast of Canada” (2018) *PLoS ONE* 13(6): e0198348 ; Christine Hodgson and Angela Spooner, *The K’ómoks and Squamish Estuaries: A Blue Carbon Pilot Project, Final Report to North American Partnership for Environmental Community Action (NAPECA), Grant 2014-1362* (2016), online:

University³⁰, the University of British Columbia³¹, the Hakai Institute³² and McGill University.³³ Parks Canada has already been working collaboratively with blue carbon researchers in BC, and is developing a national carbon atlas for federally protected areas that will eventually include coastal areas and blue carbon.³⁴

Salt marsh and blue carbon in BC

Blue carbon ecosystems found in southern coast regions of British Columbia are salt marshes and seagrass meadows. However, seagrass meadows at this more northerly latitude have so far been found to have lower carbon sequestering capabilities compared to more tropical eelgrass beds.³⁵ This means that salt marshes are likely to have greater potential for carbon sequestration in the southern coastal area of British Columbia. Boundary Bay has the largest salt marsh in the Lower Mainland, for example, with a current size of more than 380 ha, which is about 17% of its historical extent from the mid-1800s.³⁶



Photo: Boundary Bay salt marsh, Lower Mainland, BC (Gord McKenna).

Comox Valley Project Watershed Society https://projectwatershed.ca/wp-content/uploads/2016/07/Project%20Watershed_NAPECA%20Final%20Report.pdf; M. Hessing-Lewis, R. Sanders-Smith, A.K. Salomon, "Limnology and Oceanography, Reduced water motion enhances organic carbon stocks in temperate eelgrass meadows" (2019) <https://aslopubs.onlinelibrary.wiley.com/doi/abs/10.1002/lno.11101>;

³⁰ Dr. Karen Kohfeld, Climate, Oceans and Paleo-Environments Lab, School of Resource and Environmental Management, Simon Fraser University.

³¹ Dr. Sarah Knox, Department of Geography, University of British Columbia.

³² Dr. Margot Hessing-Lewis, Research Scientist, Hakai Institute.

³³ Dr. Gail Chmura, Associate Professor, Department of Geography, McGill University.

³⁴ Further information is online: Parks Canada <https://www.pc.gc.ca/en/nature/science/climat-climate/atlas>

³⁵ V.R. Postlewaite, A.E. McGowan, K.E. Kohfeld, C.L.K. Robinson, and M.G. Pellatt, "Low blue carbon storage in eelgrass (*Zostera Marina*) meadows on the Pacific Coast of Canada" (2018) PLoS ONE 13(6): e0198348; C. Prentice *et al*, "A Synthesis of Blue Carbon Stocks, Sources and Accumulation Rates in Eelgrass (*Zostera marina*) Meadows in the Northeast Pacific" (2020) Global Biochemical Cycles 34:2, online: <https://doi.org/10.1029/2019GB006345>

³⁶ In 1978 the extent of the saltmarsh was estimated to be 380 ha. Government of BC, Government of Canada, *Fraser River Estuary Study Summary* (1978), online: <https://www.for.gov.bc.ca/hfd/library/documents/Bib68894.pdf>. More recent images of the marsh provided through Google Earth indicate that the salt marsh appears to be slowly increasing in size.

Policy and planning for coastal ecosystems in BC – where does blue carbon fit in?

Global action to include blue carbon in national greenhouse gas inventories and to address coastal ecosystems in climate mitigation and adaptation policies and planning – along with emerging research about blue carbon along Canada’s coasts – makes it worthwhile to consider how blue carbon might be managed and measured in BC, and how to realize the multiple benefits for climate mitigation, ecosystem adaptation and natural infrastructure.³⁷

It is important to note there is no overarching ‘coastal’ law for BC (whether provincial, federal or Indigenous). That means there is no single agency focused on coastal management, and no secretariat with related functions to support integrated research, planning and monitoring.³⁸ This is in contrast to many other jurisdictions, such as Nova Scotia, Washington, California, Australia, and New Zealand.³⁹ Instead, jurisdiction is fragmented and siloed. As a result, there has been little attention to the cumulative effects of human activities on coastal ecosystems in the Lower Mainland, and no significant, coordinated efforts at coastal ecosystem protection and restoration by federal or provincial governments.

Indigenous nations in BC have been leading a range of coastal ecosystem protection initiatives. Just two of a number of examples are described here. In Burrard Inlet, the Tsleil-Waututh Nation is promoting environmental stewardship by leading collaboration and research.⁴⁰ On the North and Central Coast, Indigenous nations partnered with the Province of BC to develop comprehensive marine plans for that region, although the plans have not yet been implemented in BC or federal law. Neither of these initiatives have addressed blue carbon to date.⁴¹

In the absence of an overarching coastal management law for BC at the federal or provincial level, different aspects of managing coastal ecosystems and the areas where they are found are addressed by a number of different federal and provincial laws. This means that exploring options to introduce blue carbon policy and to align or incorporate blue carbon policy with other policies related to coastal ecosystem protection and restoration necessarily involves looking at a substantial cross-section of existing legislation. To keep the scope manageable, two questions are asked:

- whether there is any opportunity to develop a specific blue carbon policy or regulation using a particular regulatory tool; and
- whether the law being considered supports ecosystem-based management (EBM) for coastal ecosystems and communities, as a proxy for law and policy that would have a positive impact

³⁷ Because this brief was developed to complement technical research carried out in Boundary Bay, it has a number of references to blue carbon management opportunities in the Lower Mainland, although the policy discussion is intended to be relevant to other coastal regions in BC.

³⁸ Beginning in 1977 the provincial government began to study the Fraser estuary and warned that it may be nearing an ecological threshold. During the period of the Fraser Estuary Management Program, (1994-2013) a partnership among federal, provincial and regional government agencies, more work was done to assess the state of the environment, but with no formal, legal mandate, funding and interest from government agencies dwindled over time and eventually the federal government formally shut the program down.

³⁹ Nova Scotia: *Coastal Protection Act*, SNS 2019, c.3; Washington: *Shoreline Management Act of 1971*, Chap. 90.58 RCW; California: *California Coastal Act* (2019), Public Resources Code, Div. 20; California Conservancy Act, Public Resources Code, Div. 21, Sec. 31000; New South Wales, *Coastal Management Act 2016*, No. 20; New Zealand: *Resource Management Act 1991*, No. 69; New Zealand Coastal Policy Statement 2010.

⁴⁰ See, for example: Tsleil-Waututh Nation, *Burrard Inlet Action Plan*, online: <https://twnsacredtrust.ca/burrard-inlet-action-plan/>

⁴¹ Marine Plan Partnership for the North Coast (MaPP), online: <http://mappocean.org>

on blue carbon resources in coastal and marine ecosystems. In addition, reciprocal opportunities for blue carbon management and research to lend support to EBM and achieving other benefits are also noted. EBM has been helpfully defined as: “an adaptive approach to managing human activities that seeks to ensure the coexistence of healthy, fully functioning ecosystems and human communities.”⁴²

A further section of the paper looks specifically at carbon offsets in a blue carbon context, and explores some of the issues that would need to be addressed.



Photo: Great blue heron (Steve Crowhurst via Pixabay)

⁴² See Heiltsuk, Kitasoo/Xai'Xais, Nuxalk and Wuikinuxv Nations & Province of British Columbia, *Central Coast Marine Plan Overview*, 2015, online: http://mapocean.org/wp-content/uploads/2015/11/cc_mapp_overview_v3.84_web.pdf Ecosystem-based management was considered as a proxy for supporting blue carbon management rather than spatial protection, *per se*, because of the integration with humans and human activities and adaptive management for long term resilience. An EBM approach was used in the Marine Action Planning Partnership (MaPP) process between a number of coastal Nations and the Province of BC, and as was noted in the Central Coast Marine Plan overview, “..the principles of EBM are very similar to the principles and ethics which inform resource management and enhancement by Central Coast Nations now and for thousands of years.” (at 7)

BC PROVINCIAL LAWS

BC has many laws that apply to and in coastal wetlands. None specifically consider blue carbon, or address its management. Nor has BC has assessed the vulnerability of its coastal wetlands to sea level rise in any systematic way, and therefore it lacks data and analysis to manage risks.⁴³ Analysis from the Pacific coast of the United States suggests risks and projected changes are significant and that BC should be doing more.⁴⁴

1) Land Act, Land Title Act – Provincial Crown aquatic lands⁴⁵

In Canadian law, BC has ownership and jurisdiction over much of the foreshore (below the high water mark to the low water mark) as well as the seabed and the waters within the ‘jaws of the land,’ i.e. Strait of Georgia,⁴⁶ with the federal exceptions noted below. Land on the foreshore, the seabed, and marine waters under provincial ownership and jurisdiction are referred to by BC as “Crown aquatic lands’. The *Land Act* and the *Land Title Act* apply to provincial Crown land, including aquatic land.

These statutes and their regulations do not refer to environmental management or objectives except in limited ways.⁴⁷ However, s 18 of the *Land Act* does prohibit the disposition of Crown land below the natural boundary without Cabinet approval.

It is also possible under the *Land Act*, for the provincial Cabinet to create a “land reserve”, or for the responsible Minister to withdraw land from disposition, including for the purposes of conserving natural or heritage resources. In both cases the same authority can reverse the decision.⁴⁸ These types

⁴³ To date BC has only done a high level shoreline sensitivity analysis. See D. Biffard, T. Stevens, A. Rao, B. Woods, *BC Parks Shoreline Sensitivity Model* (2014), online: <https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42825>. An example of a study that took this type of analysis further and considered sea level rise and coastal squeeze (but not vertical accretion rates of marshes) for the south eastern coast of the United States is S. Borchert, M.J. Osland, N.M. Enwright, and K.T. Griffith, K.T. “Coastal wetland adaptation to sea level rise: Quantifying potential for landward migration and coastal squeeze” (2018) *J Applied Ecology* 55:5, 2876. <https://doi.org/10.1111/1365-2664.13169>

⁴⁴ K. Thorne, G. MacDonald, G. Guntenspergen, R. Ambrose, K. Buffington, B. Dugger, C. Freeman, C. Janousek, L. Brown, J. Rosencranz, J. Holmquist, I. Smol, K. Hargan, and J. Takekawa, “U.S. Pacific coastal wetland resilience and vulnerability to sea-level rise” (2018) *Science Advances* 4:2, eaa03270 DOI: 10.1126/sciadv.aao3270

⁴⁵ *Land Act*, RSBC 1996, c 245 and *Land Title Act*, RSBC 1996, c 250.

⁴⁶ *Reference re: Ownership of the Bed of the Strait of Georgia and Related Areas* [1984] 1 SCR 388

⁴⁷ *Land Act*, RSBC 1996, c 245 and *Land Title Act*, RSBC 1996, c 250. When considering applications for subdivisions, an approval officer appointed under the *Land Title Act* must consider whether proposed development “would adversely affect the natural environment...to an unacceptable level.” (s 86(1)(c)(6)). Subdivision approving officers are also directed to consider the impacts of contaminated sites regulations (s 85.1). In the 1990s the provincial government led land use planning processes that aimed to develop consensus among different stakeholders about land use management, policies and objectives for specific regions across the Province, but these processes were not mandated by legislation and have only been implemented in legal objectives in a limited way. Jessica Clogg, *Land Use Planning for Nature, Climate and Communities: Taking Stock and Moving Forward*. (2013), online: West Coast Environmental Law. https://www.wcel.org/sites/default/files/old/files/WCEL_LandUse_report_web.pdf. Regarding coastal regions, there was some work done to develop multi-stakeholder plans for coastal and estuarine areas. See online: Government of British Columbia <https://www2.gov.bc.ca/gov/content/industry/crown-land-water/land-use-planning/coastal-marine-plans>. There was no province-led land-use planning for the region that contains the Lower Mainland, although it contains significant areas of undeveloped land. The Province was also a partner in the intergovernmental Fraser Estuary Management Program which discussed in more detail below. More recently the Province partnered with First Nations along the north and central coast in the Marine Action Planning Partnership process, online: <http://mappocean.org/>

⁴⁸ *Land Act*, RSBC 1996, c 245, ss 15, 16, 17.

of reserves or withdrawals are sometimes used as interim measures pending designation of Wildlife Management Areas or other conservation designations.⁴⁹

In the cases where leases and licences are granted on Crown lands under the *Land Act* to third parties there is no statutory requirement to consider environmental impacts or objectives.⁵⁰ However, the Strategic Policy: Crown Land Allocation Principles do note that:

Decisions should consider social, economic and environmental outcomes that may ensue as a result of an allocation of Crown land. Benefits may be short or long term, direct or indirect.⁵¹

► MANAGING BLUE CARBON

There is no legal requirement for the Province of BC to consider the assessment and management of blue carbon on provincial Crown aquatic lands.

The *Climate Change Accountability Act*⁵² sets targets for BC greenhouse gas reductions, but blue carbon is not included within the BC greenhouse gas emissions that are counted.⁵³ Thus, although failing to protect coastal ecosystems from sea level rise and other threats could mean the future loss of stored carbon and increased greenhouse gas emissions, this is not addressed by existing legislation and regulations.

The Act also creates a requirement for the BC government to be “carbon neutral” each year with respect to its own operations.⁵⁴ “Blue carbon” is currently not a regulated emissions source or sink, and not among the greenhouse gas emissions managed from a Crown Lands perspective as an outcome of their Crown land management policies, but potentially it could be.⁵⁵

► SUPPORTING ECOSYSTEM-BASED MANAGEMENT

There is no mandate for ecosystem-based management in the *Land Act* and related regulation and policy. Applying a blue carbon lens to the provincial management of Crown lands would

⁴⁹ See Ministry of Forests, Lands and Natural Resource Operations, *Management of Crown Lands for Conservation Purposes* (2015), online: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/conservation_crown_land.pdf and Ministry of Forests, Lands and Natural Resource Operations, *Land Use Operational Policy, Reserves, Withdrawals, Notations and Prohibitions* (2011), online: <https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/reserves.pdf> A responsible Ministry can also create a Notation of Interest with respect to an area of Crown land (including aquatic land) which is not an instrument under the *Land Act* but essentially creates a marker in the land registry system that flags the need to refer any land applications or planned disposition to the Ministry making the notation.

⁵⁰ Unless the license or lease is associated with an activity that requires an environmental assessment under provincial or federal legislation.

⁵¹ Ministry of Forests, Lands and Natural Resource Operations, *Strategic Policy: Crown Land Allocation Principles* (2011) online: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/allocation_principles.pdf

⁵² *Climate Change Accountability Act*, SBC 2007, c 42, s 2.

⁵³ Ministry of Environment and Climate Change Strategy, *Methodology Book for the British Columbia Provincial Greenhouse Gas Inventory*, (June 2019), online: Government of British Columbia https://www2.gov.bc.ca/assets/gov/environment/climate-change/data/provincial-inventory/bc-methodology-book_ghg-provincial-inventory.pdf

⁵⁴ *Climate Change Accountability Act*, SBC 2007, c 42, ss 5, 6.

⁵⁵ *Climate Change Accountability Act*, Carbon Neutral Government Regulation, BC Reg 392/2008, s 4.

involve identifying the current extent of specific coastal ecosystems (coastal wetlands and seagrasses), considering risks to their persistence, opportunities to increase future extent, and understanding historical extent and reasons for losses, including past and ongoing human activities. All of this information is part of blue carbon accounting, but it is also relevant for ecosystem-based management. It could help support the articulation of a “value” or a regulatory objective in maintaining and restoring these ecosystems that is not currently expressed in provincial decision-making about Crown aquatic lands.

2) BC Wildlife Act – Wildlife Management Areas⁵⁶

Under the *Wildlife Act*, the Province can designate Wildlife Management Areas (WMAs)⁵⁷. This designation means that the area will be managed primarily for conservation purposes and any activities in these areas require written permission from the regional manager.⁵⁸ Public access is subject to restrictions.⁵⁹ Several WMAs in the Lower Fraser contain salt marsh, including brackish marsh, i.e. Boundary Bay, Roberts Bank, Sturgeon Bank and South Arm Marshes.⁶⁰ These Lower Fraser areas are also subject to an Order-in-Council from 1977 that requires an environmental assessment before almost any type of disturbance.⁶¹

The Province has conducted collaborative research related to the recession of the salt marsh of Sturgeon Bank (first observed in 2011),⁶² but to date has not developed integrated regulation, planning or policies to manage or protect the coastal ecosystems of the WMAs.

The *Wildlife Act* does not require that management plans be developed by the Province for WMAs, but there are existing, if somewhat dated, plans, or draft plans for the coastal WMAs mentioned above.⁶³

► MANAGING BLUE CARBON

Blue carbon would not appear to fall directly within the mandate established under the *Wildlife Act* to manage wildlife and wildlife habitat within WMAs. However, blue carbon management could fall among the third-party activities in the WMAs that are considered by the regional manager in developing management plans.⁶⁴ It should be noted that on-site research and

⁵⁶ *Wildlife Act*, RSBC 1996, c 488.

⁵⁷ A list of all provincial WMAs is online: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-habitats/conservation-lands/wma/wmas-list>

⁵⁸ *Wildlife Act*, s 4(4).

⁵⁹ *Wildlife Act*, Wildlife Management Area Use and Access Regulation, BC Reg 24/2015, as amended.

⁶⁰ Wildlife Management Areas Regulation, BC Reg 12/2015, as amended.

⁶¹ BC OIC 0908-1977, *Environment and Land Use Act*, RSBC 1996, c 117. This is in addition to the requirements of subsequently enacted provincial environmental assessment legislation which targets larger projects, as discussed later in this brief.

⁶² See, for example: https://6zvfw1iqd632ingiiizgapg-wpengine.netdna-ssl.com/westerncanada/files/2018/03/BalkeEric_SERWC2018_ConferenceProceedings.pdf

⁶³ These are not all available online but can be obtained from the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development on request.

⁶⁴ For example, the draft management plan prepared for Boundary Bay Wildlife Management Area (prepared in 1993, before designation) considered “resource values” in the WMA and different uses (in that case primarily hunting), online: Government of British Columbia <http://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=4156>

monitoring activities for blue carbon carried out by third parties, such as university researchers, would require written permission from the regional manager for the WMA.

► SUPPORTING ECOSYSTEM-BASED MANAGEMENT

Ecosystem-based management is not specifically supported by regulatory objectives or as a management policy for WMAs. Human activities and access are restricted, but there does not appear to have been significant monitoring or assessment of WMAs, consideration of indirect stressors, or active management for resilience. Blue carbon research can help identify the current extent of specific coastal ecosystems (coastal wetlands and seagrasses), elevations, risks to their persistence, opportunities to increase future extent, as well as historical extent and factors contributing to losses. This information could be highly relevant to decision-making about coastal ecosystems in the WMAs, including whether the regional manager would grant permission to applicants wishing to undertake activities that could potentially harm coastal ecosystems, but also in evaluating activities aimed at protecting and restoring coastal ecosystems, and risks related to sea level rise and the long term persistence of coastal ecosystems with the WMAs.



Photo: Great Blue Heron (Gord McKenna)

A number of coastal WMAs are adjacent to urban areas, and in a changing climate these communities are exploring measures to address increased flood risks due to sea level rise and storm surge. It will be important to make connections between community flood management and coastal ecosystem protection so that nature-based approaches to coastal flood regulation can be supported. In Boundary Bay, blue carbon research has helped to show that salt marsh has been accreting over past decades, and also provided information about existing vegetation types and their extent. This information is relevant for considering the current and future wave dampening benefits of the salt marsh, as well as for investigating how salt marsh habitat can be maintained and even enhanced as sea level rises.⁶⁵

3) BC Park Act, Protected Areas of British Columbia Act, Ecological Reserve Act, Environment and Land Use Act⁶⁶

BC's protected area legislation includes the *Park Act*, the *Protected Areas of British Columbia Act*, the *Ecological Reserve Act* and the *Environment and Land Use Act*. Areas designated as parks may be Class A, B or C parks, or conservancies. The stated policy objectives of designating parks include "preservation of their natural environments for the inspiration, use and enjoyment of the public."⁶⁷

⁶⁵ In Boundary Bay, a partnership of the City of Surrey, Semiahmoo First Nation and City of Delta has received funding through the federal Disaster Mitigation and Adaptation Fund to develop pilot projects that rely on "foreshore enhancements" to provide coastal flood protection services. These projects, known as the "Living Dike" involve protecting and enhancing salt marsh habitat. See <https://www.surrey.ca/services-payments/water-drainage-sewer/flood-control-and-prevention/coastal-flood-adaptation>

⁶⁶ *Park Act* RSBC 1996, c 344; *Protected Areas of British Columbia Act*, SBC 2000, c 17; *Ecological Reserve Act*, RSBC 1996, c 103; and *Environment and Land Use Act*, RSBC 1996, c 117.

⁶⁷ Province of BC, Summary of Protected Areas Designations and Allowable Activities, online at: <http://www.env.gov.bc.ca/bcparks/about/docs/summary-of-pa-designations-activities.pdf?v=1579743803602>

In 2012, the Province issued a policy statement on parks that also committed to the “proactive stewardship of ecological integrity,” while noting that ecological integrity will not be managed to the same degree across the diversity of parks in the province.⁶⁸ In 2014, the Province released a Conservation Policy for parks and protected areas that included further commitments to ecosystem-based management for these areas.⁶⁹

In the case of Class A or C parks, park use permits may only be issued for activities that support the recreational values of the parks. In Class B parks, park use permits can be issued for activities that are not “detrimental” to the recreational values of parks. Conservancies are protected areas designated under park legislation that specifically recognize social, ceremonial and cultural uses of Indigenous nations and communities, and low-impact ecological activities may be permitted. The purpose of ecological reserves is to allow scientific research and education, to protect representative ecosystems, to allow recovery and study of damaged ecosystems, and to provide refuge for rare or endangered species. Human access is restricted to permits for those activities. Protected areas may also be designated under the *Environment and Land Use Act*, and management direction is provided in the Cabinet order designating the area.

➤ **MANAGING BLUE CARBON**

Many BC provincial park areas include coastal ecosystems, but the legal mandate for park management does not specifically include managing carbon sinks or sources in parks, and it doesn’t mention climate change. The 2014 BC Parks Conservation Policy⁷⁰ does consider climate change, but from the perspective of managing protected areas so that they are adapting and resilient to climate change. A broader mandate for BC Parks to consider carbon storage and releases in parks and protected areas would appear to be compatible with existing policy directions, but there is no direct regulatory or policy trigger to require action by park managers.

➤ **SUPPORTING ECOSYSTEM-BASED MANAGEMENT**

The 2014 BC Parks Conservation Policy supports the implementation of ecosystem-based management for BC parks and protected areas, to support long-term resilience and adaptation of ecosystems, including ecological integrity and biological diversity. In the case of coastal ecosystems within protected areas, blue carbon research can help identify the current extent of specific coastal ecosystems (coastal wetlands and seagrasses), types of vegetation, elevations, risks to their persistence, opportunities to increase future extent, as well as historical extent and factors contributing to losses. This information could be highly relevant to management of coastal ecosystems in the BC parks system. It can also be useful in evaluating activities aimed at restoring coastal ecosystems, and planning for resilience and adaptation related to sea level rise.

⁶⁸ Province of British Columbia, *Ecological Integrity in British Columbia’s Parks and Protected Areas, Definition and Performance Indicators* (2012), online: Government of British Columbia <http://www.env.gov.bc.ca/bcparks/conservation/ecological-integrity-def-and-perf-indicators.pdf>

⁶⁹ Province of British Columbia, *Conservation Policy for Ecological Reserves, Parks, Conservancies, Protected Areas and Recreation Areas* (2014), online: Government of British Columbia <http://www.env.gov.bc.ca/bcparks/conservation/policy2014.pdf?v=1579748406540>

⁷⁰ *Ibid* at 3-4, and Sections 5.2, 5.10, 5.11, 5.12, 5.14.

4) BC Environmental Assessment Act

In 2018 BC passed a new *Environmental Assessment Act*.⁷¹ The Act requires that every assessment must consider greenhouse gas emissions and potential impacts on the Province's ability to meet its legislated greenhouse gas reduction targets. However, this does not include blue carbon.⁷² The *Reviewable Projects Regulation* sets thresholds for when projects are deemed to have a large enough impact to require an assessment, based on factors such as the area of land disturbed.⁷³

The new Act also provides that the Minister can direct that a regional assessment be carried out, and that future regulations may describe Ministerial obligations to perform a regional assessment where an Indigenous nation has proposed a regional assessment.⁷⁴ Regional assessments look at the "environmental, economic, social, cultural and health effects of any projects in a region of the province"⁷⁵ and could be an opportunity to assess stressors and consider cumulative impacts of projects on coastal ecosystems.

➤ MANAGING BLUE CARBON

Blue carbon is not currently measured or managed by the Province, and so is not included in provincial environmental assessments. However, provincial Crown aquatic lands, parks and protected areas throughout the coastal region include salt marshes, sea grass and kelp, which are known to be carbon sinks. Projects that cause loss or disturbance of these ecosystems lead to stored carbon being released into the atmosphere, and the loss of future capacity to sequester and store carbon over time. Because it is the Province's responsibility to manage these sensitive areas, and ongoing development pressures that can have direct and indirect impacts, it would make sense, in the future, to include blue carbon considerations, such as impacts on carbon sinks in ocean and coastal areas, in environmental assessments. Blue carbon assessment and management could be incorporated into forthcoming regional assessment regulations.⁷⁶

➤ SUPPORTING ECOSYSTEM-BASED MANAGEMENT

There are ways that regional assessments could support ecosystem-based management in coastal areas, by assessing cumulative effects across a region and over time, but regional assessments are not currently required under the Act or its regulations. If the Minister does direct that a regional assessment be undertaken, blue carbon research for the area in question

⁷¹ SBC 2018, c 51.

⁷² *Ibid* s 25(2)(h). As noted below in subsection 5, blue carbon is not presently included in the provincial inventory of regulated greenhouse gas emissions, nor is it measured by the Province.

⁷³ BC Reg 243/219 https://www.bclaws.ca/civix/document/id/complete/statreg/243_2019 It should also be noted that there is a Cabinet order from 1977 (OIC 908) applying to the xxx of the foreshores and land under water in the Lower Fraser Estuary, Boundary Bay and Semiahmoo Bay, requiring that an "environmental assessment" (undefined in the Order) be carried out in the case of certain listed activities, without specifying any thresholds. See online: https://www.bclaws.ca/civix/document/id/oic/arc_oic/0908_1977 While it might be thought that this Order has been superseded by environmental assessment legislation, the author notes that it was raised by the Province as a consideration in discussions about Boundary Bay as recently as 2019.

⁷⁴ *Environmental Assessment Act*, SBC 2018, c 51, s 35.

⁷⁵ *Ibid*.

⁷⁶ The regional assessment regulations for the 2018 *BC Environmental Assessment Act* are still under development. See online: Government of British Columbia <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/environmental-assessments/guidance-documents/2018-act-guidance-materials>

could provide relevant data about coastal ecosystems that may be affected by proposed projects. It could provide information about the ways that coastal ecosystems have suffered from previous development and about historical baselines, and could help inform understanding about thresholds or tipping points relative to different levels of future development, as well as climate stressors.

The Province has already developed a Cumulative Effects Framework (CEF) as a decision-making support tool (although it does not have any regulatory basis). It has identified “Aquatic Ecosystems” as a value for assessment but this does not appear to refer to coastal or marine ecosystems, despite the extensive provincial jurisdiction and responsibilities for coastal waters and seabed as discussed above.⁷⁷ Blue carbon research would be highly relevant for characterizing coastal and marine values because of the ecosystem-scale and long-term approach.

5) BC Climate Change Accountability Act

In 2019 BC passed the *Climate Change Accountability Act*, which updated and re-named the previous *Greenhouse Gas Reductions Act*, established an independent advisory committee to advise BC on actions to meet provincial greenhouse gas reduction targets, and established detailed reporting requirements for the BC government on its progress and actions to meet the targets.⁷⁸

The Act does not itself define which greenhouse gas sources and sinks will be measured to determine BC’s annual greenhouse gas emissions. The BC greenhouse gas inventory accounts for emission sources following the reporting categories and methodologies adopted by the United Nations Framework Convention on Climate Change. In the case of the category “Land Use, Land-Use Change and Forestry”, BC includes emissions from afforestation and deforestation in its inventory, but other land-related emissions are not included. An estimation of certain other land-related sources, which do not include coastal wetlands or other potential blue carbon sinks, is included as a line item and is based on federal data.⁷⁹

⁷⁷ See Government of BC, *Cumulative Effects Framework, West Coast*, online: Government of British Columbia <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/cumulative-effects-framework/regional-assessments/west-coast>

⁷⁸ SBC 2007, c 42, as amended November 28, 2019.

⁷⁹ BC Ministry of Environment and Climate Change Strategy, *BC Provincial Inventory Methodology Book* (August 2020), online: https://www2.gov.bc.ca/assets/gov/environment/climate-change/data/provincial-inventory/2018/bc_provincial_ghg_inventory_1990-2018_-_methodology_book.pdf See also Environment and Climate Change Canada, *National Inventory Report 1990 – 2018 – Greenhouse Gas Sinks and Sources in Canada, Canada’s Submission to the United Nations Framework Convention on Climate Change*, Part 1, Chapter 6, Land Use, Land-Use Change and Forestry (CRF Sector 4) (2020), online: http://publications.gc.ca/collections/collection_2020/eccc/En81-4-2018-1-eng.pdf Generally, the UNFCCC methodology requires countries to assign their land base to either “managed” or “unmanaged” categories and does not require reporting on emissions from unmanaged categories. See P. Iverson, D. Lee, M. Rocha, *Understanding Land Use in the UNFCCC* (2014), online: https://ghginstitute.org/wp-content/uploads/2015/04/Understanding_Land_Use_in_the_UNFCCC.pdf However, as noted above, when the USA included coastal wetlands in its national inventory, it included all coastal wetlands in the contiguous USA. See note 17.

➤ MANAGING BLUE CARBON

Blue carbon is not included as part of BC’s greenhouse gas reporting. As a result, BC does not have any framework in place to measure or monitor blue carbon sources or sinks. In its Provincial Inventory Methodology Book, BC notes that it includes only emissions from managed lands, in accordance with UNFCCC conventions, given that other land sources “are more volatile and largely determined by natural factors outside of human control.”⁸⁰ However, with respect to coastal wetland ecosystems, for example, it is clear that their health and persistence in BC has been highly impacted by human activities, and the management, or failure to manage those activities resulting in huge losses.⁸¹ It would make sense for BC to follow the lead of other jurisdictions and consider the inclusion of blue carbon sources and sinks in its inventory.

➤ SUPPORTING ECOSYSTEM-BASED MANAGEMENT

Including blue carbon in BC’s greenhouse gas reporting would create a new reason to monitor and manage the extent, health and future wellbeing of coastal ecosystems in BC, and to take this information into account across the range of decisions about those ecosystems that are presently made in an uncoordinated fashion. Blue carbon could potentially function as a proxy for ecosystem considerations in the case of *Land Act* policy and regulation, for example. Blue carbon management and monitoring could also be helpful in setting targets for restoration and rehabilitation of degraded coastal ecosystems. Blue carbon would also provide a link between provincial climate mitigation and adaptation strategies, and would help to align those strategies with biodiversity protection goals, which to date have largely been absent from provincial climate strategies.⁸²

⁸⁰ BC Ministry of Environment and Climate Change Strategy, BC Provincial Inventory Methodology Book (August 2020), at 13, online: https://www2.gov.bc.ca/assets/gov/environment/climate-change/data/provincial-inventory/2018/bc_provincial_ghg_inventory_1990-2018_methodology_book.pdf

⁸¹ See note 7, for example.

⁸² Some initial work has been done to look at the vulnerability of certain species, but this has not included any coastal or marine species. See K. Price and D. Daust, *Climate Change Vulnerability of BC’s Fish and Wildlife: First Approximation* (2016), for BC Ministry of Forests, Lands and Natural Resource Operations, online: <https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/adaptation/climate20change20vulnerability20of20bcs20fish20and20wildlife20final20june6.pdf>

FEDERAL LAWS

To date blue carbon is not specifically considered in federal legislation, although there are emerging references in policy guidance, such as the *Strategic Assessment of Climate Change*, and also research initiatives directed through the federal parks program as described below. At the same time, as is the case with provincial regulation and management of coastal and marine areas, there are opportunities for a blue carbon lens to inform ecosystem-based management approaches to conservation, restoration, and the management of harvesting as well as other activities that have direct and indirect impacts on coastal and marine ecosystems.

1) Federally protected areas – Canada National Parks Act, Canada National Marine Conservation Areas Act, Oceans Act, Canada Wildlife Act, and Migratory Birds Convention Act

The federal government has a number of different regulatory options for designating protected areas in marine and coastal areas. *Canada's Ocean Strategy* commits the federal government to promoting ecosystem-based management, the precautionary principle, and the “application of conservation measures necessary to maintain biological diversity and productivity of the marine environment, including the establishment of marine protected areas.”⁸³ In 2019 Canada reached its commitment under Aichi Target 11 of the *United Nations Convention on Biological Diversity* to protect a minimum of 10% of its ocean and coastal areas. In July 2020 Canada made a further commitment to protect 25% of its coastal and marine areas by 2025 and 30% by 2030.⁸⁴

As part of its coastal and marine conservation efforts, Canada has also committed to support the development of a network of marine protected areas. These will include not only federally designated protected areas, but also protected areas designated by other orders of government, including provincial and Indigenous governments.⁸⁵ This responsibility was assigned to the Minister of Fisheries and Oceans in the *Oceans Act*,⁸⁶ and has also been reflected in international commitments made by Canada under the *Convention on Biological Diversity*.⁸⁷ The definition of marine protected areas adopted by Canada is:

A collection of individual marine protected areas that operates cooperatively and synergistically, at various spatial scales, and with a range of protection levels, in order to fulfill ecological aims more effectively and comprehensively than individual sites could alone.⁸⁸

At present the network design features include “ecologically and biologically significant areas” and considerations related to ecological representation, connectivity, and viability, as well as cultural and

⁸³ Fisheries and Oceans Canada, “Canada’s Ocean Strategy” online: <http://www.dfo-mpo.gc.ca/oceans/publications/cos-soc/index-eng.html>

⁸⁴ Fisheries and Oceans Canada, “Reaching Canada’s Marine Conservation Targets” online: <https://www.dfo-mpo.gc.ca/oceans/conservation/plan/index-eng.html>

⁸⁵ See, for example, MPA Network of the Northern Bioshelf Region, online: <https://mpanetwork.ca/bcnorthernshelf/resources/#legislation>

⁸⁶ *Oceans Act*, SC 1996, c 31.

⁸⁷ Fisheries and Oceans Canada, “National Framework for Canada’s Network of Marine Protected Areas” online: <https://www.dfo-mpo.gc.ca/oceans/publications/mpanf-cnzpm/page09-eng.html#c93>

⁸⁸ WCPA/IUCN, *Establishing networks of marine protected areas: A guide for developing national and regional capacity for building MPA networks*. Non-technical summary report (2007) online: <https://www.cbd.int/doc/pa/tools/Establishing%20Marine%20Protected%20Area%20Networks.pdf>

social importance.⁸⁹ The Canada-British Columbia Marine Protected Areas Network Strategy aims to ensure both ecological and economic, cultural and social benefits.⁹⁰ Three of the bioregions identified for MPA networks in BC include both marine and coastal regions (the Northern Shelf, the Southern Shelf and the Strait of Georgia). As noted, the networks will include areas protected under federal, provincial and Indigenous laws, and will be managed through collaborative governance arrangements. In the case of the Northern Shelf Bioregion Marine Protected Area, 17 First Nations are co-leading a planning process with Canada and the Province of BC for the North and Central Coast and Haida Gwaii.⁹¹

Canada National Parks Act

Under the *Canada National Parks Act*⁹² the federal government designates national parks on federal land and water. The Gulf Islands National Park Reserve in the Salish Sea and the Pacific Rim National Park Reserve are examples of federally designated areas with coastal ecosystems. According to the legislation, the first priority in managing national parks is “maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes.”⁹³ “Ecological integrity” is defined to include “abiotic components”.⁹⁴ The Minister must prepare a management plan for the park that includes “ecological integrity objectives and indicators and provisions for resource protection and restoration.”⁹⁵

Canada National Marine Conservation Areas Act and Oceans Act (Marine Protected Areas)

The federal government can also designate marine protected areas under the *Canada National Marine Conservation Areas Act*, and the *Oceans Act*.⁹⁶ Along the BC coast there are currently three marine protected areas under this legislation.⁹⁷ For National Marine Conservation Areas, the Minister of Environment and Climate Change Canada is responsible for developing a management plan that includes human uses, but that prioritizes the protection of marine ecosystems and biodiversity.⁹⁸

MPAs are designated under the *Oceans Act* for the purpose of protecting marine species and habitats, areas of high biodiversity or productivity, or, based on amendments to the *Oceans Act* in 2019, for the purpose of maintaining ecological integrity, and are administered by the Minister of Fisheries and Oceans.⁹⁹

⁸⁹ Fisheries and Oceans Canada, “National Framework for Canada’s Network of Marine Protected Areas” online: <https://www.dfo-mpo.gc.ca/oceans/publications/mpanf-cnzpm/page09-eng.html#co3> *Oceans Act*, SC 1996, c 31, s 35(2).

⁹⁰ Fisheries and Oceans Canada, “Canada British Columbia Marine Protected Area Network Strategy” online: <https://www.dfo-mpo.gc.ca/oceans/publications/mpabc-cbzpm/index-eng.html#sec10>

⁹¹ Coastal First Nations, Great Bear Initiative, “What is a Marine Protected Area?” online: <https://coastalfirstnations.ca/our-sea/what-is-a-marine-protected-area/>

⁹² *Canada National Parks Act*, SC 2000, c 32.

⁹³ *Ibid*, s 8(2).

⁹⁴ *Ibid*, s 2 (1).

⁹⁵ *Ibid*, s 11(1).

⁹⁶ *Canada National Marine Conservation Areas Act*, SC 2002, c 18; *Oceans Act*, SC 1996, c 31.

⁹⁷ Fisheries and Oceans Canada, “Marine Protected Areas across Canada” online: <https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/index-eng.html>

⁹⁸ *Canada National Marine Conservation Areas Act*, SC 2002, c 18, s 9.

⁹⁹ *Oceans Act*, SC 1996, c 31, s 35.

“Ecological integrity” is defined as:

a condition in which

- (a) the structure, composition and function of ecosystems are undisturbed by any human activity;
- (b) natural ecological processes are intact and self-sustaining;
- (c) ecosystems evolve naturally; and
- (d) an ecosystem’s capacity for self-renewal and its biodiversity are maintained.¹⁰⁰

Canada Wildlife Act

Under the *Canada Wildlife Act*¹⁰¹ the Minister of Environment and Climate Change Canada can designate national wildlife areas on public federal lands assigned to their administration, and has specific authorization to designate marine national wildlife areas, although this occurred for the first time in 2018 with the designation of the Scott Islands Marine National Wildlife Area off the north-western tip of Vancouver Island.¹⁰² The 349 ha Alaksen National Wildlife Area in the Fraser delta also contains some remnant coastal wetlands. Activities in national wildlife areas are restricted, and permitting applies.¹⁰³ The broad purpose of national wildlife areas is to support the conservation of wildlife and related research programs.



Photo: Snowy owls, Fraser delta (Michele W.)

Migratory Birds Convention Act

The Canadian Wildlife Service of Environment and Climate Change Canada manages federally designated Migratory Bird Sanctuaries (MBS) across the country in support of Canada’s commitments under the US – Canada *Convention for the Protection of Migratory Birds*.¹⁰⁴ An MBS can be designated on federal, provincial, territorial or private lands.¹⁰⁵ Criteria for establishing an MBS include areas where there are significant regional populations of migratory birds, where there are area-specific threats to migratory birds, and where there are populations of threatened species of migratory birds.¹⁰⁶ Within an MBS, migratory birds are protected, as are their nests and habitat, unless special permitting is obtained.¹⁰⁷

¹⁰⁰ *Oceans Act*, s 35(1.1).

¹⁰¹ *Canada Wildlife Act*, RSC 1985, c W-9.

¹⁰² The Scott Islands themselves are protected under provincial legislation out to the low water mark, while the National Wildlife Area protects the surrounding marine waters. Management of the wildlife area is led by Environment and Climate Change Canada, supported by collaboration with Province of British Columbia, Tlatlasikwala First Nation, Quatsino First Nation and stakeholders including industry and environmental organizations. Government of Canada, “Scott Islands marine National Wildlife Area” online: <https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/locations/scott-islands-marine.html>

¹⁰³ *Canada Wildlife Act*, RSC 1985, c W-9; Wildlife Area Regulations, CRC, c 1609, s 3 and Schedule 1.

¹⁰⁴ *Convention for the Protection of Migratory Birds in the United States and Canada*, USA & Canada, 1916, as amended.

¹⁰⁵ *Migratory Birds Convention Act*, SC 1994, c 22; Migratory Birds Sanctuary Regulation, CRC, c 1036.

¹⁰⁶ Government of Canada, “Selection and management of migratory bird sanctuaries” online: <https://www.canada.ca/en/environment-climate-change/services/migratory-bird-sanctuaries/selection-criteria/management.html>

¹⁰⁷ Migratory Birds Sanctuary Regulation, CRC, c 1036.

In BC, five of the MBS are in coastal areas in southern BC, reflecting the importance of those locations as stops on the Pacific Flyway, and also the concentration of human activities that creates the need for specific protection for migratory birds. The largest is the Victoria Harbour MBS (1840 ha). In the Fraser delta the federally designated George C. Reifel MBS (376 ha) overlaps the Alaksen National Wildlife Area.¹⁰⁸ Although the MBS does not contain salt marsh, it provides habitat for migratory birds that also rely on nearby salt marsh habitat, and illustrates the connectedness of coastal habitats, and the need for this to be reflected in designation and management of coastal protected areas.

Other federal tools for coastal and marine conservation

While it is not protected under legislation, the Maplewood Flats Conservation Area in North Vancouver illustrates another approach that has been effective in practice. The conservation area is on lands owned by the Vancouver Fraser Port Authority and the District of North Vancouver and leased to Environment and Climate Change Canada, and contain some coastal wetlands including salt marsh. The conservation area, which is also on the territory of the Tsleil-Waututh Nation, is administered by the non-profit Wild Bird Trust of British Columbia.¹⁰⁹

The federal government also has jurisdiction under the *Species at Risk Act* to designate critical habitat for listed endangered species although to date this has not been used to designate any areas within coastal ecosystems in British Columbia.¹¹⁰ Critical habitat in marine areas has been designated for southern and northern resident killer whales.¹¹¹



Photo: Maplewood Flats (Mark Faviell via Flickr Creative Commons)

¹⁰⁸ Government of Canada, "Migratory Bird Sanctuaries across Canada" online: <https://www.canada.ca/en/environment-climate-change/services/migratory-bird-sanctuaries/locations.html#bc>

¹⁰⁹ See online at: <http://wildbirdtrust.org/>

¹¹⁰ SC 2002, c 29.

¹¹¹ Killer whale (*Orcinus orca*) in the Northeast Pacific: critical habitat order, SOR/2009-68 February 19, 2009.

► MANAGING BLUE CARBON

Although there are a number of federal statutes that can be used to provide spatial protection in marine and coastal areas, as discussed above, the statutes and their regulations do not establish a mandate to directly manage the blue carbon stored in coastal and nearshore ecosystems.

Only federal parks legislation appears to create a specific opportunity to directly consider blue carbon in management plans, by including “abiotic” elements in its definition of ecological integrity. Parks Canada has developed an ambitious program to inventory carbon sinks and flows in the protected areas it manages, including coastal and marine areas. The research and expertise developed through this work can benefit blue carbon management across all federal protected areas, as well as management and decision-making by other orders of government in relation to blue carbon.

Parks Canada Leadership – the Carbon Atlas

In the case of national parks and reserves, because federal legislation specifically refers to “abiotic components”, this might be interpreted to include the carbon stored in coastal ecosystems. Parks Canada has been an early contributor to research assessing the blue carbon stored in coastal ecosystems in BC.¹¹²

At present Parks Canada has a multi-year initiative to develop a “carbon atlas” for the protected areas it manages, and while the first instalment has documented carbon stocks and flows for forested ecosystems, future plans include extending this to other ecosystems including salt marshes and sea grasses.¹¹³

However, there is notable overlap among the marine areas identified for protection under federal legislation, i.e. between areas with biodiversity and high productivity, and areas likely to have significant blue carbon resources. Kelp, seagrass and salt marsh ecosystems all support biodiversity and are highly productive. Designating and managing MPAs for “ecological integrity” as defined in the *Oceans Act* could well also align well with blue carbon management, by including “self-sustaining” areas where the “structure, composition and function of ecosystems is undisturbed by human activity”. Even ‘species-focused’ legislation, such as the *Canada Wildlife Act* and regulations, refers to the importance of habitat, as well as the need for research to support conservation. While current policy and regulation does not specifically address blue carbon management in these protected areas, it could be usefully expanded to do so.

It appears that the development of marine protected area networks offers exactly this type of opportunity: to explore possibilities for blue carbon management at a larger spatial scale, and build on the work that Parks Canada has undertaken. The federal MPA Network Guidance, in discussing climate resilience, notes that kelp, seagrass and salt marsh ecosystems all contribute to the sequestration of blue carbon, and will be included as priorities in MPA network planning

¹¹² See V.R. Postlewaite, A.E. McGowan, K.E. Kohfeld, C.L.K. Robinson, and M.G. Pellatt, “Low blue carbon storage in eelgrass (*Zostera Marina*) meadows on the Pacific Coast of Canada” (2018) PLoS ONE 13(6): e0198348. See also “Blue carbon on the West Coast” at: <https://www.pc.gc.ca/en/nature/science/climat-climate/carbone-carbon>

¹¹³ Further information is online: Parks Canada <https://www.pc.gc.ca/en/nature/science/climat-climate/atlas>

by virtue of their value as representative habitats using the prescribed ecological classification systems.¹¹⁴

► SUPPORTING ECOSYSTEM-BASED MANAGEMENT

Ecosystem health in coastal areas in BC is tied to the health of the ecosystems that also, incidentally, store blue carbon. Understanding more about these ecosystems, including their present extent, their historical rates of growth or loss can illustrate their responses to stressors in the past and help predict future resilience, and opportunities for management to improve resilience.

With the specific legal mandate to manage and restore ecological integrity, Parks Canada is itself well-positioned to make use of the data that blue carbon research can provide about coastal ecosystems, and certainly could share this data with federal agencies and other authorities that manage protected areas in coastal regions in BC. Managing for long-term resilience in the networks of MPAs across coastal areas in BC would benefit from the ecosystem-level information that blue carbon research can provide. As noted in a recent report that examined how to assess overall changes in ocean health along the coast of BC:

Effective management of marine systems requires quantitative tools that can assess the state of the marine social-ecological system and are responsive to management actions and pressures.¹¹⁵

As well, the longer-term perspectives that blue carbon research offers may help to manage some of the issues around “shifting baselines”, where present conditions are taken as a benchmark and do not account for the impacts of human activities, and in particular for BC the impacts of colonial settlement and development over the past 150 years. This has been flagged as an important issue to consider in the design of MPA networks, to ensure that there is sufficient ambition about ecosystem health, and that what may be present-day degraded conditions are not taken as an indication of the true potential of ecosystems.¹¹⁶

2) Federal Impact Assessment Act

The 2019 federal *Impact Assessment Act*¹¹⁷ introduces a specific requirement that impact assessments of designated projects must consider the impact of the project on Canada’s environmental obligations and climate change commitments.¹¹⁸ The new legislation does not specify how the impact of projects on climate change commitments will be considered. Instead, it provides for a “strategic assessment” by

¹¹⁴ Fisheries and Oceans Canada, “National Framework for Canada’s Network of Marine Protected Areas” online: <https://www.dfo-mpo.gc.ca/oceans/publications/mpanf-cnzpm/page09-eng.html#C93>

¹¹⁵ C. O’Hara *et al*, “Changes in ocean health in British Columbia from 2001 to 2016” (2020) PLoS ONE 15(1): e0227502, online: <https://doi.org/10.1371/journal.pone.0227502>

¹¹⁶ WCPA/IUCN, *Establishing networks of marine protected areas: A guide for developing national and regional capacity for building MPA networks*. Non-technical summary report (2007) online: <https://www.cbd.int/doc/pa/tools/Establishing%20Marine%20Protected%20Area%20Networks.pdf> See also L. McClenachan *et al*, “Shifted Baselines Reduce Willingness to Pay for Conservation” (2018) *Front. Mar. Sci.* online: <https://doi.org/10.3389/fmars.2018.00048>

¹¹⁷ SC 2019, c 28.

¹¹⁸ *Ibid* s 22(1)(i).

the federal government to establish overarching guidance for how climate change commitments will be considered in the conduct of impact assessments.¹¹⁹

➤ MANAGING BLUE CARBON

Blue carbon implications will be considered for projects assessed under the *Impact Assessment Act*. The *Strategic Assessment of Climate Change* released by the Government of Canada in July 2020 includes blue carbon in its definition of a “carbon sink” (“the ability of a forest, ocean or other natural environment to absorb carbon from the atmosphere”), and requires that carbon sinks be included in the quantification of GHG emissions, and in information about the project provided at both the planning and impact statement phases of the new impact assessment process.¹²⁰

At the planning state, section 4.1.2 of the *Strategic Assessment* notes that:

The Information and Management of Time Limits Regulations require project proponents to provide a description of the physical and biological environment of the project’s location. Project proponents should provide the following information to help IAAC, or the relevant lifecycle regulators, with the support of expert federal authorities, understand the potential impacts on carbon sinks:

- a description of the activities that would result in an impact on carbon sinks; and
- land areas expected to be impacted by the project, by ecosystem type (forests, cropland, grassland, wetlands, built-up land) over the course of the project lifetime, including any areas of restored or reclaimed ecosystems.

At the impact statement phase, section 5.1.2 provides that:

The calculation of a project’s net GHG emissions accounts for emissions related to land-use change. Proponents must also provide a qualitative description of the project’s positive or negative impact on carbon sinks. This is because some projects may improve or reduce the ability of an ecosystem, land area or ocean to absorb carbon dioxide from the atmosphere. An impact on a carbon sink implies the interruption or alteration of a natural continual process that removes carbon from the atmosphere.

This information must include:

- Description of project activities in relation to significant landscape features such as topography, hydrology and regionally dominant ecosystems.
- Land areas directly impacted by the project, by ecosystem type (forests, cropland, grassland, wetlands, built-up land) over the course of the project lifetime; this includes the areas of restored or reclaimed ecosystem(s).
- Initial carbon stocks in living biomass, dead biomass and soils (by ecosystem type) on land directly impacted by the project over the course of the project lifetime.

¹¹⁹ *Ibid* s 95.

¹²⁰ Government of Canada, *Strategic Assessment of Climate Change* (2020) online: <https://www.strategicassessmentclimatechange.ca/15112/widgets/61020/documents/36886>

- Fate of carbon stocks on directly impacted land, by ecosystem type: immediate emissions, delayed emissions (timeframe), storage (e.g., in wood products).
- Anticipated land cover on the impacted land areas after the project is in place.

Environment and Climate Change Canada will at a future date provide a methodology for estimating losses or gains to carbon sinks. It appears this will include a federally approved methodology for assessing blue carbon resources.

However, while the *Strategic Assessment* requires that this information be provided by project proponents, it does not prescribe how the information will be considered, that is, what the impact of the information will be on the impact assessment of the project. As well, it is not clear how, if at all, the federal government will be looking to manage blue carbon resources collectively.

➤ SUPPORTING ECOSYSTEM-BASED MANAGEMENT

Blue carbon research may be useful for federal impact assessments, by helping to better understand the coastal ecosystems that may be affected by proposed projects. As described above, blue carbon research can help identify the current extent of specific coastal ecosystems (coastal wetlands and seagrasses), i.e. baseline data, risks to their persistence, opportunities to increase future extent, as well as historical extent and factors contributing to losses. In particular, a better understanding about the ways that coastal ecosystems have suffered from previous development could inform assessment of proposals for new projects.

In addition, the new *Impact Assessment Act* provides for “regional assessments.” Although not defined in detail, they are described as an assessment of the “effects of existing or future physical activities carried out in a region.”¹²¹ According to the federal government these assessments are aimed, in part, at helping to “guide planning and management of cumulative effects (including on biodiversity and species at risk).”¹²² Blue carbon research may be useful for understanding the cumulative effects of development on coastal ecosystems, and for understanding thresholds or tipping points related to future developments, the future impacts of existing development, and climate stressors.

3) Federal Fisheries Act

The federal government has jurisdiction over fisheries (including fish habitat), and the *Fisheries Act* prohibits the harmful alteration, destruction or damage of fish habitat without federal approval.¹²³ Provisions in the recently amended version of the Act authorize regulations and policy to support restoration of habitat.¹²⁴ Court interpretation of “fish habitat” confirms that it extends to include areas

¹²¹ *Ibid* ss 92-94. More detail about regional assessments will be provided in new regulations currently being developed.

¹²² <https://www.canada.ca/en/services/environment/conservation/assessments/environmental-reviews/environmental-assessment-processes/cumulative-effects.html>

¹²³ *Fisheries Act*, RSC 1985, c F-14, s 35(1). This now includes considering the impacts of cumulative effects, s 34.1(1)(d).

¹²⁴ *Fisheries Act*, RSC 1985, c F-14. This includes developing a plan to rebuild fish stocks, s 6.2, and also the designation of an Ecologically Significant Area and the development of a fish habitat restoration plan, s 35.2(2), (9).

that are not always underwater, including the foreshore and saltmarsh in particular, as well as seagrasses.¹²⁵

➤ MANAGING BLUE CARBON

The *Fisheries Act* does not provide any legal mandate for Fisheries and Oceans Canada (DFO) to directly manage blue carbon. On the other hand, blue carbon researchers should be aware of *Fisheries Act* provisions and regulations in case their field research activities require DFO approvals.

➤ SUPPORTING ECOSYSTEM-BASED MANAGEMENT

Although ecosystem-based management is not part of the mandate of the federal government to protect fish and fish habitat, it is not inconsistent with the specific responsibilities of DFO to protect and restore fish habitat, including a new requirement related to the management of cumulative effects from any harm to fish habitat that is allowed by regulation.

Previously DFO has not managed the cumulative effects of fish habitat alteration and destruction, and, worse, projects intended to compensate for approving alteration and destruction often appear to have failed.¹²⁶ The Act now requires cumulative effects to be considered in creating regulations in regards to activities that have a negative impact on fish habitat¹²⁷. The Act also allows for the designation of Ecologically Significant Areas (ESAs), for which fish habitat restoration plans are required to be prepared if necessary to achieve objectives related to conservation and protection of fish and fish habitat.¹²⁸ No ESAs have yet been designated since the provisions came into force in 2012.

As noted, blue carbon research can help identify the current extent of specific coastal ecosystems (such as coastal wetlands, seagrasses and kelp beds), including baseline data, risks to their persistence, opportunities to increase future extent, as well as historical extent and factors contributing to losses. This information could be used to inform DFO planning for protection and restoration, and could help inform DFO funding programs for habitat restoration.¹²⁹

In the past DFO has acknowledged that it has knowledge gaps related to coastal ecosystems that create challenges in managing for species like forage fish,¹³⁰ and DFO researchers have also confirmed that ecosystem information in the broader context is highly relevant for species

¹²⁵ See, for example, *R. v. Bowcott*, 1998 CanLII 999 (BCSC).

¹²⁶ M. Lievesley, D. Stewart, R. Knight, and R. Mason, *Marsh and Riparian Habitat Compensation in the Fraser Estuary: A Guide for Managers and Practitioners* (2017) online: Community Mapping Network of BC https://www.cmnb.ca/wp-content/uploads/2018/11/Lievesley-et-al-2016_Marsh-riparian-habitat-compensation-in-the-Fraser-River-Estuary.pdf

¹²⁷ *Fisheries Act*, RSC 1985, c F-14, s 34.1(1)(d).

¹²⁸ *Fisheries Act*, RSC 1985, c F-14, ss 35.2(2),(9).

¹²⁹ See, for example, the Coastal Restoration Fund under the Oceans Protection Plan, <https://www.dfo-mpo.gc.ca/oceans/crf-ffc/description-eng.html>

¹³⁰ See, for example, J.P. Lemieux *et al*, *Proceedings of the DFO/PSAT Sponsored Marine Riparian Experts Workshop, Tsawwassen, BC, February 17-18, 2004*, online: Fisheries and Oceans Canada <http://www.dfo-mpo.gc.ca/library/281799.pdf>

protection.¹³¹ A recent DFO workshop gathered information about the state of knowledge of kelp and other macroalgal species in BC's coastal waters. It was noted that kelp beds provide important fish habitat for juvenile salmon and spawning herring, but that information gaps exist.¹³²

4) Federal lands owned and managed by the Vancouver Fraser Port Authority – Canada Marine Act

Coastal lands and waters under direct federal authority in British Columbia also include federal port lands. Under the *Canada Marine Act* the Vancouver Fraser Port Authority (VFPA) in the Lower Mainland is required to develop a land use plan for the lands and waters that it administers.¹³³ This land-use plan is focused on development, but the VFPA has to take into account “relevant social, economic and environmental matters,” as well as local government zoning on neighbouring lands.¹³⁴ One of the goals stated in the current land-use plan is that “Port Metro Vancouver is a global leader among ports in the environmental stewardship of the lands and waters it manages”.¹³⁵

Development on federal port lands is subject to federal environmental assessment, as well as the *Fisheries Act*. VFPA undertakes rehabilitation projects in coastal areas around the Lower Mainland required by the *Fisheries Act* to “compensate” for habitat losses and impacts associated with port development activities. A review of habitat compensation projects undertaken in the Lower Fraser (by a variety of proponents) found that the results from an environmental perspective were less than satisfactory, i.e. only one-third of the projects were even moderately successful.¹³⁶ VFPA also participates in “habitat banking” through an arrangement with DFO, i.e. it carries out environmental rehabilitation projects in advance of planned development in order to offset future habitat impacts and losses.¹³⁷

¹³¹ S. Guénette *et al*, *A review of the ecological role of forage fish and management strategies* (2014), online: Fisheries and Oceans Canada <http://www.dfo-mpo.gc.ca/Library/352141.pdf> In the Burrard Inlet, DFO has recently provided funding to Tsleil-Waututh Nation to lead an investigation to collect baseline data to “characterize[e] the status of coastal ecosystem and environmental conditions in the Port of Vancouver area.”

¹³² C.D. Levings, and H.L. Stewart, (2020). Research Priorities for Nearshore Algae in Coastal British Columbia Workshop and Gap Analysis – Final Report. Can. Manusc. Rep. Fish. Aquat. Sci. 3191: iv + 26 online at: <https://waves-vagues.dfo-mpo.gc.ca/Library/40857815.pdf>

¹³³ SC 1998, c 10, s 48. The specific uses that the Port can allow on the lands and waters that it manages are set out in its Letters Patent, (esp. Article 7 and Appendix A) online: Vancouver Fraser Port Authority <https://www.portvancouver.com/wp-content/uploads/2015/07/2008-Letters-Patent.pdf>

¹³⁴ *Ibid*, s 48(1).

¹³⁵ *Port Metro Vancouver Land Use Plan* (2014), online: Vancouver Fraser Port Authority <https://www.portvancouver.com/wp-content/uploads/2015/06/port-metro-vancouver-land-use-plan-english.pdf> The land use plan also includes the objective that VFPA will “[c]ollaborate with environmental agencies, local governments, First Nations and stakeholders on environmental initiatives and in the monitoring, protection and enhancement of critical terrestrial, marine and estuarine environments.

¹³⁶ M. Lievesley, D. Stewart, R. Knight and R. Mason, *Marsh and Riparian Habitat Compensation in the Fraser Estuary: A Guide for Managers and Practitioners* (2017) online: Community Mapping Network of BC <https://www.cmnc.ca/wp-content/uploads/2018/11/Lievesley-et-al-2016-Marsh-riparian-habitat-compensation-in-the-Fraser-River-Estuary.pdf>

¹³⁷ See *Working Agreement Concerning Procedures for the Development and Operation of the Port Metro Vancouver Habitat Bank between Vancouver Fraser Port Authority and Fisheries and Oceans Canada* (July 31, 2012), online: Vancouver Fraser Port Authority https://www.portvancouver.com/wp-content/uploads/2015/05/Habitat_Banking_Program_Working_Agreement_-_Port_Metro_Vancouver_and_Fisheries_and_Oceans_Canada.pdf Recent amendments to the *Fisheries Act* create a legislative basis for habitat banking, but stop short of allowing third parties to bank credits from projects. See ss 42.01-04.

➤ MANAGING BLUE CARBON

The existing mandate of VFPA for land use planning and management includes the broad requirement to take into account environmental matters. While this could include the management of blue carbon, on its own it does not provide strong direction to VFPA. For its greenhouse gas (GHG) inventory (conducted every 5 years), VFPA accounts primarily for GHGs from burning fossil fuels from marine shipping, rail, non-road transport and trucking.¹³⁸

➤ SUPPORTING ECOSYSTEM-BASED MANAGEMENT

Because VFPA continues to be engaged in fish habitat compensation projects and offset banking, working together with DFO, it could also make use of blue carbon research to help identify the current extent of specific coastal ecosystems (coastal wetlands and seagrasses), i.e. baseline data, risks to their persistence, opportunities to increase future extent, as well as historical extent and factors contributing to losses. This research could also be relevant for its land use planning and management, including the VFPA land-use plan objectives related to cooperating with other agencies to develop best practices and programs for ecosystem protection and restoration, as well as habitat restoration and monitoring activities.¹³⁹



Photo: Vancouver Fraser Port Authority terminal, Delta, BC (Brian Van Snellenberg)

¹³⁸ See Port of Vancouver, *2015 Port Emissions Inventory Report*, online: Vancouver Fraser Port Authority <https://www.portvancouver.com/wp-content/uploads/2017/12/2015PortEmissionsInventory.pdf>

¹³⁹ *Port Metro Vancouver Land Use Plan* (2014), Objective 3.1 and related policy directions, online: Vancouver Fraser Port Authority <https://www.portvancouver.com/wp-content/uploads/2015/06/port-metro-vancouver-land-use-plan-english.pdf>

INDIGENOUS LAWS AND JURISDICTION

Coastal lands and water in BC are subject to Indigenous laws and inherent jurisdiction and authority, and, in Canadian law, constitutionally protected title and rights. Federal and provincial jurisdiction and “ownership” of lands and water must be viewed in this light going forward as we undertake the work of decolonization. Provincial commitments to implementing the United Declaration on the Rights of Indigenous Peoples (UNDRIP) have now been legislated in BC, and the provincial government, “must take all measures necessary to ensure the laws of British Columbia are consistent with the Declaration.”¹⁴⁰ This legislated commitment opens the possibility of new dialogues with Indigenous nations that will transform provincial law, policy and management across BC.¹⁴¹ At this early stage it is not possible to predict outcomes, but we can say that legal pluralism has been acknowledged, and it offers challenges but also rich possibilities.¹⁴²

Indigenous-led conservation and management of coastal biodiversity and ecosystems has been carried out successfully and sustainably along BC coasts for many millennia, governed by Indigenous laws and practices. Some Indigenous nations in BC (and across Canada) are now exploring what have been referred to as “Indigenous Protected and Conserved Areas”, which would themselves also reflect the diversity of laws, knowledge and practices in different Indigenous territories.¹⁴³ In BC, the Tla-oh-qui-ahht Tribal Parks are one example, bringing together biodiversity protection, culture, and sustainable economic activities.¹⁴⁴

Interjurisdictional arrangements between Indigenous and non-Indigenous governments are also already part of the BC coastal and legal landscape. The Gwaii Haanas Agreement, between the Haida Nation and the Government of Canada, recognizes the Haida Heritage Site and establishes the federal National Marine Conservation Area Reserve. It is an example of an interjurisdictional governance arrangement for coastal and marine protection that acknowledges that both the Haida Nation and the Crown assert sovereignty over the area. The Agreement outlines shared objectives, stating that “all actions related to the planning, operation and management of the Archipelago will respect the protection and preservation of the environment, the Haida culture, and the maintenance of a benchmark for science and human understanding.” The Agreement also creates a management board with representatives from both governments.¹⁴⁵

The Marine Plan Partnership for the North Pacific Coast (MaPP) is a partnership between 17 Indigenous nations and the Province of British Columbia that has developed four marine plans and a regional action framework covering 102,000 km² of coastal and marine waters, relying on Indigenous knowledge and western science. Marine use plans from the Indigenous nations provided a foundation

¹⁴⁰ *Declaration on the Rights of Indigenous Peoples Act*, SBC 2019, c 44, s 3.

¹⁴¹ A recent BC example in the coastal context is the government-to-government process established between Kwikwasut'inuxw Haxwa'mis, 'Namgis and Mamalilikulla First Nations and the Province regarding aquaculture. Online: http://www.namgis.bc.ca/wp-content/uploads/2018/06/lou_broughtonfn_27june2018-sm.pdf

¹⁴² See, for example, Gordon Christie, “Indigenous Legal Orders, Canadian Law and UNDRIP” (2017) in *UNDRIP Implementation, Braiding International, Domestic and Indigenous Laws*, online: Centre for International Governance Innovation <https://www.cigionline.org/sites/default/files/documents/UNDRIP%20Implementation%20Special%20Report%20WEB.pdf>

¹⁴³ *We Rise Together: Achieving Pathway to Canada Target 1 through the creation of Indigenous Protected and Conserved Areas in the spirit and practice of reconciliation* (2018). Indigenous Circle of Experts Report and Recommendations. Online: https://www.iccaconsortium.org/wp-content/uploads/2018/03/PA234-ICE_Report_2018_Mar_22_web.pdf

¹⁴⁴ *Ibid* at 88.

¹⁴⁵ Gwaii Haanas Agreement, between Government of Canada and the Council of the Haida Nation, January 1993. Online: <http://www.haidanation.ca/wp-content/uploads/2017/03/GwaiiHaanasAgreement.pdf>

of community priorities and strategic direction for the larger area plans, which include ecosystem-based management and articulation of ecological, social and economic objectives. The planning process, associated governance and its outcomes demonstrate a successful model of co-led and collaborative marine spatial planning by Indigenous and non-Indigenous governments. After leaving the table in 2011, the federal government is now involved again, creating the possibility of further planning and implementation related to marine protected areas and marine spill preparedness.¹⁴⁶

► MANAGING BLUE CARBON

If Indigenous nations decide to express specific legal interests in blue carbon in British Columbia arising from their unextinguished Aboriginal title, there are precedents for recognition of Indigenous ownership in provincial law, based on previous work in relation to forest carbon. Although the context with respect to blue carbon is not precisely the same, in the case of forest carbon some Indigenous nations have negotiated government-to-government Atmospheric Benefit Sharing Agreements with the Province regarding ownership of carbon credits associated with increased carbon sequestration or avoided emissions from the creation of new protected areas and other shifts to ecosystem-based management in forests on the central and north Pacific coast.¹⁴⁷ A similar model could potentially be developed for blue carbon, for example in relation to kelp forests.

The Regional Action Framework (2016) developed for the MaPP includes Action 3.1(c): Engage in the Province of British Columbia's blue carbon assessment framework to estimate the potential for marine carbon sequestration in the MaPP region.¹⁴⁸

► SUPPORTING ECOSYSTEM-BASED MANAGEMENT

Blue carbon research can help identify the current extent of specific coastal ecosystems (coastal wetlands, seagrasses and kelp beds), risks to their persistence, opportunities to increase future extent, as well as confirming historical extent and factors contributing to losses. This information could be relevant to other aspects of coastal ecosystem management aimed at protecting or enhancing overall ecosystem health as well as the health of particular species. Salt marshes and sea grasses provide habitat for other species, protect water quality, and contain culturally important plants. Kelp management may support Indigenous-led herring roe fisheries, as well as providing sustainable harvest opportunities.

¹⁴⁶ S. Diggon *et al*, "The Marine Plan Partnership for the North Pacific Coast – MaPP: A collaborative and co-led marine planning process in British Columbia" (2020) Marine Policy, online: http://mappocean.org/wp-content/uploads/2020/07/Diggon_2020_MAPP_overview_compressed.pdf

¹⁴⁷ <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/first-nations-negotiations/atmospheric-benefit-sharing-agreements>

¹⁴⁸ Marine Plan Partnership for the North Pacific Coast, Regional Action Framework (2016), online: https://coastalfirstnations.ca/wp-content/uploads/2017/06/raf_mapp_v2.22_web.pdf

As illustrated through the MaPP process, ecosystem-based management can be more fully realized by weaving together Indigenous knowledge and western science. Blue carbon research, with its relatively broad spatial and temporal scope, and its questions about ecosystem health and persistence, may also help direct Western thinking towards appreciating and learning from the refined management of the land and water by Indigenous peoples in BC, founded on precise observations, deep understanding of ecosystem relationships, and long timeframes.¹⁴⁹¹⁵⁰



Photo: Kelp (Ben Wicks via Unsplash)

¹⁴⁹ Timothy D. Jardine, “Indigenous knowledge as a remedy for shifting baseline syndrome” (2019) *Frontiers in Ecology and the Environment*, 17:1,13, online: <https://esajournals.onlinelibrary.wiley.com/doi/10.1002/fee.1991>

¹⁵⁰ At the same time, a blue carbon lens obviously does not in itself overcome the limitations of western approaches to management and governance in coastal regions, some of which are described in this brief. Other limitations relate to culture and worldview. See, for example, Raychelle Daniel, “Understanding our Environment Requires an Indigenous Worldview” (5 December 2019) *Eos Earth and Space News*, online: <https://eos.org/opinions/understanding-our-environment-requires-an-indigenous-worldview>

LOCAL GOVERNMENT REGULATION

Local Government – Local Government Act, Community Charter, Dike Maintenance Act

Local governments in BC, exercising delegated authority from the Province, have little direct authority over coastal lands and waters seaward of the natural boundary.¹⁵¹ However, local governments do regulate or manage upland drainage, sewage and watercourses, all of which have impacts on coastal ecosystems.¹⁵² Local governments also have the power to use their zoning powers over the foreshore and the surface of the water within municipal boundaries, which often extend several hundred metres seaward of the natural boundary. For example, a local government may zone a coastal area within its boundaries to exclude docks.¹⁵³

Further, local governments are usually responsible for planning, building and maintaining coastal flood infrastructure, subject to provincial standards and guidance. Usually this infrastructure takes the form of sea dikes and flood gates. Three municipalities in the Lower Mainland – Richmond, Surrey and Delta – are the diking authorities for much of the sea diking infrastructure in the area.¹⁵⁴ A provincial statute, the *Dike Maintenance Act*, requires that municipally-owned dikes be constructed and maintained to provincial standards.¹⁵⁵

In terms of spatial protection, local governments in BC can dedicate municipal and district lands as parks, which typically blend recreational use, and in most cases, some native vegetation.¹⁵⁶ In addition to zoning areas specifically for conservation, they can require that natural features be protected through development permitting.¹⁵⁷ Provincial regulations require local governments to ensure freshwater riparian buffer zones, but do not apply to marine riparian areas.¹⁵⁸ Some local governments

¹⁵¹ *Local Government Act*, RSBC 2015, c 1; *Community Charter*, SBC 2003, c 26. Local governments can zone uses out to their municipal or district boundaries, which may extent several hundred meters seaward of the natural boundary. For example, a local government can zone to exclude private docks, *Local Government Act*, s 479.

¹⁵² Notable for the Lower Mainland is the extent of agricultural land in the Fraser delta in coastal areas, and its drainage into sensitive coastal wetlands. Local government authority in relation to land in the Agricultural Land Reserve is relatively limited with respect to farming activities (although it does apply to non-farming activities on ALR land in most cases).

¹⁵³ *Local Government Act*, s 479. For example, District of Squamish Zoning Bylaw, No. 2200, 2011, Zone P-4, Ecological Reserve, online: <https://squamish.civicweb.net/filepro/documents/68132>

¹⁵⁴ See, for example: BC Ministry of Forests, Lands and Natural Resource Operations, *Costs of Adaptation – Sea Dikes and Alternative Strategies, Final Report* (2012), online: Government of British Columbia http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/cost_of_adaptation-final_report_oct2012.pdf

¹⁵⁵ *Dike Maintenance Act*, RSBC 1996, c 95. This statute doesn't reference to ecosystems and environmental factors in dike construction although new dikes (or modification of existing dikes with new land disturbance) protecting an area from flooding greater than or equal to 10 km² will require an environmental assessment under BC legislation, see *Environmental Assessment Act*, SBC 2018, c 51, Reviewable Projects Regulation, BC Reg 243/2019, Part 5 – Water Management Projects. Regarding the construction and maintenance of dikes, a 1999 policy document developed by Fisheries and Oceans Canada and the Province of British Columbia, *Environmental Guidelines for Vegetation Management on Flood Protection Works to Protect Public Safety and the Environment*, references only riverine, not coastal dikes. Online: http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/env_gd_veg_man.pdf

¹⁵⁶ *Community Charter*, SBC 2003, c 26, s 30 and *Local Government Act*, RSBC 2015, c 1, s 278, s 559, s 564(4). “Park” is not defined in either statute, but common law interpretations usually emphasize that parks are areas set aside for “public use.” In principle, there doesn't necessarily have to be any native or any vegetation in a park. Some local governments develop park strategies that articulate the public values and uses that they seek to implement, and this can include conservation and protection of ecosystems. See, for example, District of North Vancouver, *Parks and Open Space Strategic Plan*, which includes considerations of “ecological integrity,” online: <https://www.dnv.org/sites/default/files/edocs/parks-and-open-space-strategic-plan-final.pdf>

¹⁵⁷ *Local Government Act*, RSBC 2015, c 1, ss 489 – 491.

¹⁵⁸ *Riparian Areas Protection Act*, SBC 1997, c 21.

negotiate leases with the provincial government to acquire direct management authority over provincial foreshore and nearshore areas.¹⁵⁹ As is the case with federal and provincial authority, this is subject to constitutionally protected Aboriginal title and rights, as well as inherent Indigenous jurisdiction. The provincial *Heritage Conservation Act*,¹⁶⁰ which has provisions about archaeological sites, may also apply.

➤ MANAGING BLUE CARBON

Local governments in BC are required to have greenhouse gas mitigation policies in their Official Community Plans¹⁶¹, and those that have signed the Climate Action Charter are aiming for carbon neutrality.¹⁶²

Back in 2012 the Union of BC Municipalities Annual Convention endorsed a resolution from Comox Valley Regional District asking that local governments be able to invest in blue carbon projects, such as estuary restoration projects, to meet their carbon neutral commitments.¹⁶³ The Province of British Columbia responded to the resolution by noting that it was an “exciting” concept, but that there was not yet a “reliable, robust method to measure Blue Carbon”, and encouraged local governments to invest in research.¹⁶⁴ As discussed above, blue carbon research in BC has continued, although a blue carbon “protocol” for BC has yet to be developed.

However, in BC and elsewhere there has been growing local government interest in the connections between healthy ecosystems and healthy communities, and also in the need for urgent action to avoid and reduce GHG emissions. This is extending to further investigation of the carbon storage benefits provided by ecosystems, including freshwater and coastal wetlands, as well as kelp, and how to link this with local climate action and leadership. For example, a recent (2019-2020) assessment of carbon stored in Metro Vancouver in “soil and biomass”, essentially the living landscape, included considering “how to create carbon estimates for intertidal and estuarine ecosystems”. One of the objectives of the report is to enable Metro

¹⁵⁹ See Province of British Columbia, Land Use Operational Policy Community and Institutional Land Use, online: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/community_inst.pdf

¹⁶⁰ *Heritage Conservation Act*, RSBC 1996, c 187.

¹⁶¹ *Local Government Act*, RSBC 2015, c 1, s 473(3).

¹⁶² https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/local-governments/planning-land-use/bc_climate_action_charter.pdf Further, local governments that have signed the Climate Action Charter and complete specified reporting, including about their carbon neutral goals, are eligible to receive incentive funding (CARIP) from the Province equal to their direct carbon tax expenditures. Government of British Columbia, *Climate Action Revenue Incentive Program*, online: https://www2.gov.bc.ca/gov/content/governments/local-governments/grants-transfers/climate-action-revenue-incentive-program-carip_bc While local governments have some limitations in their ability to directly control greenhouse gas emissions in their communities, they have the capacity to manage or influence some large community sources such as energy use and transportation.

¹⁶³ UBCM, 2012 Resolutions Disposition, Resolution B76, online: <https://www.ubcm.ca/assets/Resolutions~and~Policy/Resolutions/2012-10-02%20Resolutions%20Disposition.pdf>

¹⁶⁴ Ministry of Community, Sport and Cultural Development, *Provincial Response to the Resolutions of the 2012 Union of British Columbia Municipalities Convention* (2013), online: <https://www.ubcm.ca/assets/Resolutions~and~Policy/Resolutions/Provincial%20Responses%20to%202012%20UBCM%20Resolutions.pdf>

Vancouver to evaluate how its land use policies will affect future carbon storage throughout the region.¹⁶⁵

The City of Vancouver has also continued to investigate possibilities for offsetting some of the climate impact of its community by investing in natural carbon storage, including coastal wetlands and kelp, as part of its Climate Emergency Response.¹⁶⁶ Blue carbon research has also been carried out in the Cowichan/Koksilah Estuary and in the K'ómoks and Squamish estuaries.¹⁶⁷

► SUPPORTING ECOSYSTEM-BASED MANAGEMENT

As described in a report to Metro Vancouver providing data for its “regional carbon storage dataset”, carbon storage, including blue carbon, can be a convenient “proxy” for monitoring other aspects of ecosystem health and the services that they are providing to a community. According to its authors, carbon sequestration and loss “is more practical to measure and monitor than many ecosystem services”, and can predict the levels of other ecosystem services such as soil quality regulation, air quality regulation, water provision and regulation, resilience, biodiversity, and genetic resources. Once a baseline has been established, changes can be monitored, and the impacts of human activities considered, both from a current and future perspective.¹⁶⁸ Thus measuring and monitoring blue carbon may offer an efficient way to track coastal ecosystem health in the region, and to evaluate the overall success of land use regulation and policy and other measures.

In terms of the legal tools and policies available to local governments in BC to support coastal ecosystem health, the toolbox is relatively limited, as discussed above. Local governments can use regulatory powers to manage land use and land use practices above the high water mark, and can have some limited regulation of uses below the high water mark. That said, requiring adequate setbacks from the natural boundary, naturalized approaches to landscaping and ensuring that construction activity related to development does not contribute to erosion or pollution can be important contributions to supporting coastal ecosystem health and resilience.¹⁶⁹ Effective stormwater management and sewage treatment can also reduce the levels of marine water pollution.

However, where sea diking exists to protect coastal communities from coastal flooding, sea level rise could mean the loss of remaining coastal ecosystems. If the dikes were not there, marshes

¹⁶⁵ C. Welham and B. Seely, *Improving the Metro Vancouver Regional Carbon Storage Dataset, Final report* (2019) online: <http://www.metrovancouver.org/services/air-quality/AirQualityPublications/ImprovingMetroVancouverRegionalCarbonStorageDataset-2019Jan3.pdf>

¹⁶⁶ Brightspot Climate Inc., *City of Vancouver Climate Emergency Response, Big Move 6 Conceptual Framework* (2020) online: <https://bids.vancouver.ca/bidopp/RFP/documents/PS20200892-AddendumNo.1.pdf>

¹⁶⁷ See online: <https://www.cowichanestuary.com> and C. Hodgson and A. Spooner, “The K'ómoks and Squamish Estuaries: A Blue Carbon Pilot Project, Final Report to North American Partnership for Environmental Community Action (NAPECA) Grant 2014-1362 Comox Valley Project Watershed Society” (2016) online: https://projectwatershed.ca/wp-content/uploads/2020/05/Project-Watershed_NAPECA-Final-Report-ComoxValleyElgrass.pdf

¹⁶⁸ C. Welham and B. Seely, *Improving the Metro Vancouver Regional Carbon Storage Dataset, Final report* (2019) at 46, online: <http://www.metrovancouver.org/services/air-quality/AirQualityPublications/ImprovingMetroVancouverRegionalCarbonStorageDataset-2019Jan3.pdf>

¹⁶⁹ *Local Government Act* RSBC 2015, c 1, ss 470, 523, 527.

and other coastal vegetation would gradually migrate landward to higher elevations. With the dikes in place, existing coastal vegetation may eventually be permanently underwater, and unable to survive. This phenomenon is sometimes referred to as “coastal squeeze.” Even if a local government is using its regulatory powers to manage land use behind the dikes in a way that would support ecosystem health, as described above, the coastal ecosystems will not survive sea level rise.

In this case there may be opportunities for local governments to contribute to measures that involve coastal ecosystem protection, and restoration or enhancement in a way that also provides flood regulation and coastal adaptation benefits. This will necessarily involve permitting and licenses from other orders of government, and collaborative approaches.

In British Columbia, for example, the City of Surrey and the City of Delta, in partnership with Semiahmoo First Nation, are currently developing pilot projects to explore how enhancements of existing salt marsh can complement more traditional diking infrastructure along the shore, by providing wave attenuation and moderating storm surge.¹⁷⁰ The City of Richmond has acknowledged that the marsh lying seaward of its West Dike, the ecologically important Sturgeon Bank, is also critical to the City's flood protection program, and recent research confirms the importance of the marsh for wave attenuation.¹⁷¹ A blue carbon lens can provide valuable data about marsh elevation levels, accretion rates, likely persistence with projected rates of sea level rise and other information that is highly relevant for the flood management activities of these local governments.



Photo: Sturgeon Bank/West Dyke, Richmond, BC (Gord McKenna)

¹⁷⁰ The pilot projects are funded through the Disaster Mitigation and Adaptation Fund administered by Infrastructure Canada. Apart from technical questions, the projects also aim to explore how to design and implement the projects in a multi-jurisdictional environment. <https://www.newswire.ca/news-releases/canada-helps-protect-surrey-from-disastrous-impacts-of-flooding-854800918.html>

¹⁷¹ City of Richmond, *Report to Public Works and Transportation Committee* (June 21, 2018), PWT-35, online: City of Richmond https://www.richmond.ca/agendafiles/Open_PWT_7-18-2018.pdf and Krista Forsynski, *Nature-based Flood Protection: The Contribution of Tidal Marsh Vegetation to Wave Attenuation at Sturgeon Bank* (M.Sc., School of Resources, Environment and Sustainability, University of British Columbia, 2019) [unpublished].

Carbon offsets and blue carbon

Carbon offsets are a mechanism used both in regulated carbon markets and in the ‘voluntary’ carbon market, to notionally balance the benefit of an action that reduces or avoids greenhouse gas emissions against the emissions added to the atmosphere from another activity. For example, in some regulated emissions programs, greenhouse gas polluting industries may be allowed to purchase carbon offsets from projects that reduce or avoid emissions instead of directly reducing their own emissions.¹⁷² In the voluntary market carbon offsets are often purchased by individuals taking flights, as a way to account for the climate impacts of air travel. Nature-based offsets – where a project involves increasing carbon sequestration in vegetation and soils, or avoiding the release of carbon through damage or loss of vegetation – can also create other benefits such as habitat protection, air and water quality, and others, depending on the type of project.

However, in order for offsets to achieve real and measurable benefits for the global atmosphere, they have to meet a number of criteria. One of the most important is additionality, which means that the activity performed or the change in behaviour to create the carbon offset would not have happened otherwise, without the payment for the offset. For example, if a forest is already legally protected from logging, there can be no offsets created, because the protection doesn’t have anything to do with an offset. Often determining additionality involves comparing a baseline scenario with what happens as a result of the offset project activity.¹⁷³

Another important criterion is permanence. If the offset involves protecting a forest, or a salt marsh, it has to be lasting protection. For a salt marsh or other vegetated coastal ecosystem this may be challenging, given sea level rise, even if the current spatial area of the salt marsh were to acquire legal protection. Although it is possible, in some locations, that salt marshes may have an adequate source of sediment to allow them to increase their elevation at a rate that is at least as fast as current sea level rise, in others they are likely to become inundated, meaning that the carbon stored in the vegetation and soils will break down and be returned to the atmosphere. Usually the minimum time period for ‘permanent’ is at least 100 years.¹⁷⁴ ‘Leakage’ is also important to consider. This means, for example, that an activity that is harmful to the atmosphere is stopped in one location but is simply transferred to another one, with no net improvement.¹⁷⁵

¹⁷² See for example, the California Air Resources Board Compliance Offset Program, online: <https://ww3.arb.ca.gov/cc/capandtrade/offsets/offsets.htm>

¹⁷³ See, for example, Government of Canada, *Carbon Pollution Pricing: Considerations for Protocol Development in the Federal Greenhouse Gas Offset System* (2020), online: <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system/carbon-pollution-pricing-considerations-protocol-development.html>

¹⁷⁴ Gail L. Chmura, “What do we need to assess the sustainability of the tidal salt marsh carbon sink?” (2013) *Ocean & Coastal Management*, 83:25, online: <https://doi.org/10.1016/j.ocecoaman.2011.09.006>

¹⁷⁵ Government of Canada, *Carbon Pollution Pricing: Considerations for Protocol Development in the Federal Greenhouse Gas Offset System* (2020), online: <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system/carbon-pollution-pricing-considerations-protocol-development.html>

Accurate carbon accounting is also a much-needed foundation for carbon offsets. It may be sufficient (and compelling) to have higher level estimates of carbon storage and sequestration rates for coastal ecosystems where the information is helping to inform a decision to protect or restore a coastal ecosystem to achieve multiple benefits (but not to provide offsets). This will not be the case where there are offsets, and the carbon accounting is being relied on to create a specific carbon reduction or avoided emission so that another carbon polluting activity can go ahead. In California a methodology for quantifying offsets from activities to restore coastal wetlands has been developed, and a methodology for activities that protect tidal wetlands from degradation has also been developed for the voluntary carbon market.¹⁷⁶

Municipal leadership on coastal restoration and greenhouse gas mitigation

As a follow-up to declaring a climate emergency in January 2019, and continuing its ‘greenest city’ leadership,¹⁷⁷ the City of Vancouver adopted an ambitious plan to reduce its own climate impact through direct action and also by restoring forest and coastal ecosystems in the region. The plan includes a goal that “[b]y 2030, restoration work will be completed on enough forest and coastal ecosystems in Vancouver and the surrounding region to remove one million tonnes of carbon pollution annually by 2060.” The staff report acknowledged that the City would have to cooperate with a number of different government agencies and organizations to achieve this goal.¹⁷⁸ Subject to the caveats noted above, this might be an opportunity to advance blue carbon research and policy development in the region, and create multiple benefits, including biodiversity protection.



Photo: City of Vancouver (Jennifer C via Flickr Creative Commons)

¹⁷⁶ See American Carbon Registry, *Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from the Restoration of California Deltaic and Coastal Wetlands* (November 2017), online: <https://americancarbonregistry.org/carbon-accounting/standards-methodologies/restoration-of-california-deltaic-and-coastal-wetlands/ca-wetland-methodology-v1.1-November-2017.pdf> and VM0007 REDD+ Methodology Framework (REDD+MF), v1.6, September 2020, online: <https://verra.org/methodology/vm0007-redd-methodology-framework-redd-mf-v1-6/>. Reference to these methodologies in this report is included for illustrative purposes only and does not represent any endorsement of their quality, scientific basis or effectiveness.

¹⁷⁷ City of Vancouver, “Greenest City Action Plan” (2012).

¹⁷⁸ See <https://council.vancouver.ca/20190424/documents/cfsci.pdf>

Key findings and recommendations

- 1. *Canada is lagging behind other coastal countries, notably the United States and Australia, in assessing and managing blue carbon resources in coastal ecosystems.*** Because of this, we may miss opportunities to develop projects that have the ‘triple win’ of adaptation, mitigation and biodiversity protection.

Recommendations

- 1a. More federal and provincial support is needed for blue carbon research at universities, and its integration into federal and provincial policy in coastal regions. There is an opportunity to build on the foundation of the work being done for the Carbon Atlas initiative of Parks Canada.
 - 1b. The federal government should lead the development of a national inventory of coastal wetlands, in cooperation with coastal provinces, and support coastal ecosystem vulnerability assessment at regional scales that identifies specific threats to persistence and opportunities for restoration and recovery. An inventory of coastal wetlands and ecosystems is needed for blue carbon research and analysis, but is also critical for assessing vulnerability coastal ecosystems to climate and other stressors and informing adaptation and biodiversity protection by federal and provincial governments. This is further relevant for federal regulation and policy to support sustainable fisheries and regulate other economic activities along the coast. As noted above, a recent DFO workshop identified knowledge gaps related to kelp and other macroalgal species, and the made specific recommendations that should be supported.
 - 1c. The federal government should set ambitious targets for coastal habitat restoration, given significant losses in many regions, and federal funding for coastal habitat restoration projects should incentivize linkages to blue carbon research and management.
- 2. *Applying a blue carbon lens to the provincial laws and regulation that BC relies on to manage its coastal regions reveals that there is little mandate at the provincial level for ecosystem-based management – and this is a problem.*** A lack of regulatory objectives for coastal ecosystem health and management is mirrored by institutional knowledge gaps about the present and historical extent of coastal ecosystems and risks related to stressors, including climate change. The Province has developed some policies to support ecosystem-based management for protected areas, such as parks, which could include coastal areas. However, outside of protected areas, decision-making about activities on Crown aquatic lands, unless subject to environmental assessment, is not required to take into account environmental impacts or objectives, much less cumulative impacts on ecosystem health. Although the Province has engaged in marine and coastal planning initiatives, both in the past and more recently in cooperation with Indigenous nations in the Marine Action Planning Partnership process, it has, for the most part, not translated this planning into regulation and decision-making. A blue carbon lens shows that BC is not doing enough to protect its incomparably valuable coastal ecosystems from the impacts of climate change, and from habitat loss and pollution, although it has ample jurisdiction to do so. This also means it is missing opportunities to explore how coastal ecosystem restoration and planning can be part of its strategies for climate mitigation and adaptation.

Recommendations

- 2a. BC should take steps to fill in knowledge gaps about the effects of sea level rise and other climate impacts on coastal ecosystems, so that the vulnerability of coastal ecosystems to climate and other stressors can be properly assessed. For example, BC previously commissioned high-level analysis of shoreline sensitivity, but more work is needed to assess risks to coastal ecosystems.
- 2b. BC should create a coordinated and integrated legal framework for its decision-making and regulation in relation to coastal regions and ecosystems. Managing blue carbon may offer a pathway, at least conceptually, to policy approaches that take into account coastal ecosystem health and overcome some of the existing gaps and deficiencies in provincial laws. However, enduring and consistent changes to policy and practice require the support of legislation and regulation. As well, although BC ultimately shares coastal jurisdiction and decision-making with federal and Indigenous authorities, it would be helpful if BC managed its own coastal jurisdiction in a more integrated and transparent way with a clear, legislated mandate to protect coastal ecosystems. This could in turn support better and perhaps more credible collaboration with other orders of government.

3. *BC is missing opportunities to link coastal ecosystem protection and restoration, and biodiversity benefits, with provincial climate mitigation and adaptation strategies.*

Recommendations

- 3a. BC should develop an inventory of coastal wetlands and other coastal ecosystems (such as kelp forest and eelgrass beds), with an initial focus on areas that it currently manages as protected areas, conservation lands, and other Crown aquatic lands, and assess the blue carbon resources and potential of these areas.
 - 3b. BC should partner with the federal government and Indigenous nations to evaluate and manage blue carbon resources through government-to-government agreements and related cooperation, as well as assessing sustainable economic activities that could be associated with blue carbon management, such as kelp farming.
 - 3c. BC should integrate blue carbon assessment, monitoring and management into its climate mitigation and adaptation strategies.
- 4. *Sea level rise and other climate impacts are driving local government adaptation planning for land use and infrastructure along the coast as they explore ways to keep their communities safe and liveable in light of increased flood risks. Managing blue carbon aligns well with nature-based coastal flood infrastructure projects that depend on protecting and enhancing vegetated coastal ecosystems for the long term, leading to the triple benefits of mitigation, adaptation and biodiversity protection.*** It also aligns with shoreline regulation that promotes soft shore, nature-based protection measures by private landowners. Yet local governments lack authority to influence the management of coastal ecosystems, and have limited authority to regulate shoreline protection measures by private landowners. They also lack resources for the research, design and experimentation needed to develop and implement innovative, nature-based approaches that are

compatible with living ecosystems. As a result, local governments will find it challenging to diverge from more conventional approaches, such as dikes. At the same time, some local governments are pursuing ambitious climate action agendas, and have already expressed interest in consideration of blue carbon in greenhouse gas reduction strategies.

Recommendations

- 4a. Federal and provincial funding for coastal flood infrastructure projects should incentivize nature-based approaches that protect coastal ecosystems, and adaptive management approaches that include pilot projects and phased implementation. Linkages to blue carbon research and analysis should be explored.
- 4b. Federal and provincial agencies that manage coastal regions should actively support or lead evaluation of the blue carbon resources within their jurisdiction on a regional and a sub-regional basis, using best available methods and knowledge, and make the findings publicly available.
- 4c. The Province should explore options for linking local government land use and other regulations directly to coastal ecosystem protection and restoration, for example by developing marine riparian regulations.
- 4d. The Province should also explore the development of foreshore and aquatic land tenures that are specifically compatible with local government reliance on vegetated coastal ecosystems for flood protection, as well as with soft shore protection measures by individual coastal property owners, taking into consideration the need for any new tenures to be consistent with the *Declaration on the Rights of Indigenous Peoples Act*.

- 5. ***Healthy coastal ecosystems may provide opportunities for blue carbon offsets that could themselves support sustainable economic activities.*** Blue carbon offsets could play a role in climate action in Canada and BC, whether in regulatory or voluntary carbon markets. As with any type of carbon offsets, blue carbon offsets would need to meet rigorous requirements for additionality, permanence and other criteria in order to ensure that their use was making a real contribution to reducing greenhouse gas emissions. The rights to blue carbon offsets are at present not determined, but the model of forest carbon offset agreements from the Great Bear Rainforest which support Indigenous ownership may offer guidance.

Recommendations

- 5a. Canada and BC should support the development of offset protocols and methodologies that could be used to support blue carbon offsets from protection and restoration of BC coastal ecosystems.
- 5b. Building on recommendations 3b and 4a, BC should explore a framework that would allow local governments to invest in blue carbon offsets as part of their climate action strategies (which would address a resolution passed at the 2012 Union of BC Municipalities Annual Convention).
- 5c. BC should assess blue carbon potential within MaPP and other marine and coastal planning and management initiatives, and/or provide resources to Indigenous nations that wish to undertake this assessment.



WEST COAST
Environmental Law

West Coast Environmental Law
#700-509 Richards Street, Vancouver, BC V6B 2Z6
x^wməθk^wəyəm (Musqueam), Skw̓xwú7mesh (Squamish)
& sə́ilwətaʔt (Tseil-Waututh) Territories

604-684-7378 (toll-free in BC: 1-800-330-WCEL)
www.wcel.org • admin@wcel.org • [@WCELaw](https://twitter.com/WCELaw)