

Health impacts of sea level rise on BC's coastal communities

Sea level rise due to melting ice sheets and thermal expansion of the ocean poses serious risks for coastal communities. Elevated sea levels erode shorelines and inundate low-lying coasts; these changes, in turn, allow high tides and storm surges to reach unprotected areas further inland. The perturbed coastal environment will lead to severe impacts on health.

In British Columbia, 80% of the population lives within 5 km of the coast, with the majority concentrated in Metro Vancouver and southern Vancouver Island.¹ Along the north coast, many settlements in Haida Gwaii, as well as Kitimat and Prince Rupert, are near sea level.¹

Displacement

Under current provincial estimations, sea levels around BC are projected to rise by 0.5 metre by 2050, and 1.0 metre by 2100, making many low-lying lands vulnerable to displacement from flooding tidal inflow and storm surge.¹

Sea level rise will have both acute and long-term effects on those now living near to shore. Acutely, flooding can lead to residential water infiltration and consequent mold growth, cold water immersion, drowning, and other injuries.² Over the longer term, loss of coastal land will lead to population displacement. Given the growing population and limited land availability in BC, displaced residents may find themselves competing with others for valuable land on elevated ground.

Displacement also has long-term health impacts. A 2017 study from the United Kingdom found a significant increase in the rates

of anxiety, depression, and posttraumatic stress disorder for individuals who were displaced as a consequence of flooding compared to those who experienced flooding but were not displaced.³ Inability to return home after a flood acts as a stressor that induces or exacerbates malnutrition, hypertension, and cardiac events.^{3,4}

In addition, much of the existing health infrastructure in BC will require relocation as a consequence of sea level rise, disrupting health services not only for people living near the ocean but those across the province who rely on these coastal facilities. Richmond and Delta hospitals in Metro Vancouver, which together serve a population of 300 000 people, are vulnerable to a 1-in-500-year storm surge even at today's sea level.⁵

Food security

Sea levels are predicted to rise by up to 1.2 metres in the Fraser River Delta by 2100,⁶ where BC's most productive farmlands are situated. In all, over 4600 hectares of farmland lie within 1 metre of sea level.¹ Given that BC currently produces 48% of all foods consumed in the province,⁷ flooding and saltwater intrusion pose serious food security risks. Adding to direct agricultural disturbances will be disruptions to ferry services and flooding of port terminals situated at sea level, which will affect food delivery to Vancouver Island and northern coastal communities that rely on maritime transport.

For fisheries-dependent communities, coastal erosion caused by sea level rise will lead to a loss of intertidal wetlands and upriver salmon breeding habitats, thereby reducing BC's salmon and shellfish populations. Warming waters that

lead to sea level rise also threaten BC's wildlife salmon runs. This will particularly impact Indigenous communities and others who cultivate berries and harvest fish and shellfish.

Water security

Across BC, 28.5% of residents rely on groundwater for drinking, irrigation, or industrial needs.⁸ As rises in sea level continue, the likelihood of saltwater infiltrating groundwater will increase and reduce the availability of freshwater for coastal communities. Along BC's Gulf Islands, rising sea levels are already gradually causing salt water intrusion of existing

freshwater wells and aquifers.⁹ Although the water supply for much of the Lower Mainland is located outside of coastal floodplains, sea water may damage wastewater treatment facilities, leading to spread of waterborne diseases such as *E. coli* or *salmonella*.

While its procession is gradual, sea level rise resulting from global climate change is occurring along the densely populated BC shoreline, posing both foreseeable and harder-to-foresee health risks for the province's coastal residents. While sea level rise may look like an environmental issue, it has the potential to impact many of the determinants of health, affecting everything from access to health care services and safe and nutritious food to mental health. ■

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This article is the opinion of the BC Centre for Disease Control and has not been peer reviewed by the BCMJ Editorial Board.

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1. British Columbia Ministry of Environment. Sea level rise adaptation primer: A toolkit to build adaptive capacity

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will learn a clinical approach to the evaluation and management of tropical diseases, practical laboratory skills with a focus on the identification of parasites important for the diagnosis of tropical diseases, and public health principles and applications including outbreak management. Early registration rate effective until 6 April 2020. Register early on the course website as space is limited. More information at www.spgh.ubc.ca/continuing-education/tgm2020. Contact spgh.ce@ubc.ca.

**DIABETES DIRECTORS SEMINAR
Vancouver, 8 May (Fri)**

The Endocrine Research Society is pleased to present the 32nd Diabetes Directors Seminar, an annual, UBC-accredited gathering of leading diabetes experts and caregivers across British Columbia. Join us at the Sandman Vancouver City Centre Hotel for a full-day presentation series covering the latest and most pertinent aspects of diabetes therapeutics and clinical care. Target audience: specialists and family physicians with an interest in diabetes care, nurses, dietitians, pharmacists, and other diabetes educators responsible for diabetes management within their own groups and communities. Register now as space is limited. Online registration: www.endocrineresearchsociety.com/events/32nd-annual-diabetes-directors-seminar. For more information or registration questions please contact Eric Chow at the Endocrine Research Society, endocrine.research.society@gmail.com, 604 689-1055.

CANADIAN CONFERENCE ON PHYSICIAN LEADERSHIP

Vancouver, 29–30 May (Fri–Sat)

The Canadian Conference on Physician Leadership—Accepting our Responsibility as Physician Leaders will be held at the Hyatt Regency Hotel. This 2-day educational event brings together physician leaders from across Canada and around the globe and is designed to engage and educate physician leaders at all levels. Take advantage of our four 2-day intensive and interactive preconference courses (27–28 May). For more information email carol@physicianleaders.ca, or visit www.physicianleadershipconference.com.

**GP IN ONCOLOGY TRAINING
Vancouver, 14–25 Sep and
1–12 Feb (Mon–Fri)**

BC Cancer’s Family Practice Oncology Network offers an 8-week General Practitioner in Oncology education program beginning with a 2-week introductory session every spring and fall at BC Cancer–Vancouver. This program provides an opportunity for rural family physicians, with the support of their community, to strengthen their oncology skills so that they can provide enhanced care for local cancer patients and their families. Following the introductory session, participants complete a further 30 days of clinic experience at the Cancer Centre where their patients are referred. These are scheduled flexibly over 6 months. Participants who complete the program are eligible for credits from the College of Family Physicians of Canada. Those who are REAP-eligible receive a stipend and expense coverage through UBC’s Enhanced Skills Program. For more information or to apply, visit www.fpon.ca, or contact Jennifer Wolfe at 604 219-9579.

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