

ECOLOGICAL DETERMINANTS OF HEALTH IN PUBLIC HEALTH EDUCATION IN CANADA: A SCAN OF NEEDS, CHALLENGES AND ASSETS

A Discussion Document prepared for the Ecological Determinants Group on Education (EDGE)

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1. Introduction

How the field of public health approaches, understands and responds to the rate and scale of change of the living systems on which all life – and our health – depend, warrants renewed attention. The Canadian Ecological Determinants Group on Education (EDGE) was created in 2015 in response to the Canadian Public Health Association's 2015 Discussion Document, "[Global Change and Public Health: Addressing the Ecological Determinants of Health](#)" (CPHA, 2015). This Canadian group brings together a wide range of public health and allied professionals, researchers and educators with a common interest and expertise in the ecological determinants of health (EDGE, 2016). The main goal of EDGE is to promote the integration of Ecological Determinants of Health (EDoH) into public health education, training, and professional development, with the intention that this effort will support and inform related efforts, including research, advocacy and policy relating to EDoH. The Education and Training efforts of EDGE offers a partial response to the recommendations on Education from the 2015 CPHA Discussion Paper (reproduced in **Appendix A**, see also CPHA 2015).

This discussion document and the work of EDGE are part of a wider call to reflect on, and re-invigorate commitments to foster understanding of the interconnected ecological social, cultural, economic and related values of our shared planetary home and – consistent with long-standing calls from Indigenous communities (Greenwood et al., 2015) – to increase our capacity to protect and promote the integrity these non-negotiable foundations for health (Hancock et al., 2015, CPHA 2015). Our intention in this report is to provide a background to both EDoH and EDGE as well as to present findings from a preliminary scan of needs and capacity in relation to EDoH in the context of teaching and training in Public Health in Canada. Specifically, the objectives of this preliminary scan and discussion paper are to:

- a) present an initial framing of key considerations relevant to incorporating ecological determinants of health into public health training and education in the Canadian context;
- b) provide an initial assessment of needs and challenges in the context of existing public health programs, educational strategies and professional development efforts;
- c) identify some of the types of potential assets, from related fields and initiatives that could inform future planning for future efforts to incorporate EDoH into public health education and practice.

As a preliminary scan, this document is intended to provide a platform for future more comprehensive research and evaluation, as well as informing the ongoing work of EDGE as it develops specific objectives, strategies and priorities in its efforts to incorporate EDoH into public health education and practice in Canada, and beyond.

2. Background: Ecological Determinants of Health and EDGE

The attention to EDoH described in CPHA's 2015 Discussion Document, is consistent with a range of converging and inter-related developments relevant to public health, including, but not limited to: ecological public health (Chu and Simpson, 1994; Rayner and Lang, 2012), ecohealth, and ecosystem approaches to health (Parkes and Horwitz, 2016; Webb et al, 2010), the recent emergence of Planetary Health (Whitmee et al, 2015) among others (see also Buse et al, 2018). These converging areas of research, education and practice can also be seen as a re-engagement with holistic priorities and orientations that have been proposed by Indigenous communities over millenia, including the interrelated nature of determinants of Indigenous Health (Greenwood et al. 2015).

We recognise ecosystems and ecological processes as fundamental determinants of the health of humans (and myriad other species). The air, water and food we need for our basic survival come from the Earth's natural systems, as do the fuels and materials we use to build and power our communities. Those natural systems have provided favourable conditions for the evolution of human societies, by nourishing us, protecting us from the sun's UV radiation and providing a stable, warm climate for the past 11,000 years of the Holocene, during which modern human societies have evolved (CPHA, 2015; Whitmee et al., 2015). We also recognise that human activity is driving rapid planetary-scale ecological changes that threaten human well-being and societal stability. The rapid expansion of the human population, our economic development and the power of our technology (the 'Great Acceleration' - Steffen, Broadgate, Deutsch, Gaffney and Ludwig, 2015) is causing rapid and massive changes in key Earth systems (Gaffney and Owen, 2017) and approaching or crossing 'planetary boundaries' in key Earth systems (Steffen, Richardson, Rockström et al. 2015). So great is our impact on the Earth that our imprint will be visible in geologic strata millions of years into the future (Zalasiewicz, 2016). Many argue that we are leaving the Holocene and entering the Anthropocene, a new geologic epoch that we are creating (Crutzen and Stoermer 2000), with consequences that, while unknown in their details, are foreboding in scope.

In order to continue the role of protecting and promoting health, preventing disease and injury, and reducing health inequities, public health needs to be better equipped to understand and respond to the rapid changes that are occurring to the living systems on which all life – and our health – depend. Overt attention to the ecological determinants of health is required to ensure a more fulsome understanding of the social-ecological context for health; to foster a comprehensive eco-social approach to population health promotion (Hancock, 2015) and to better equip public health to work with others to contribute toward an ecologically sustainable, just and healthy future which, while not easy, is nevertheless both possible and essential.

Specific emphasis on the EDoH within public health education, training and practice will be needed in order to meet the training needs of current and future public health professionals to more fulsomely address emerging challenges and threats to our shared planetary home. Attention to the ecological determinants of health requires recognition of three premises warranting consideration when considering how ecological determinants of health are embedded within and relate to other areas and priorities for public health (see Box 1).

Highlighting the need to move from “Ideas to Action”, the CPHA Discussion paper (2015) identified several considerations to respond to the need to “Educate public health professionals about the ecological determinants of health” (see **Appendix A**). The public health community is challenged to respond accordingly. To address these educational recommendations, the Ecological Determinants Group on Education (EDGE) was created in 2015, and has become a CPHA Working Group (EDGE, 2018).

Box 1: Three premises that enhance understanding of ecological determinants of health (EDoH) in relation to other priorities within Public Health education, training and practice.

First: Ecological determinants of health should not be seen in isolation from social determinants of health. Explicit attention to ecological determinants of health enables a more fulsome understanding of social-ecological approaches to health, and a comprehensive ecosocial approach to population health promotion (Hancock, 2015). We recognise that the demand for more integrated approaches that address both social and ecological determinants of health, especially between equity, ecosystem sustainability and public health, is not new (see, for example, Hancock, 1993; McMichael, 2001; Parkes et al., 2003; Capon, 2007; Poland and Dooris, 2010; Webb et al., 2011). At the same time, we view the explicit framing of EDoH, alongside SDoH, as a helpful and necessary contribution to a new generation of public health training and practice.

Second: Ecological determinants of health are not the same as the field of environmental health, and are also not necessarily captured within traditional framing of “environmental” determinants of health. While environmental and ecological approaches are complementary, EDoH responds to the need for explicit attention to ecologies and ecosystems as foundational to human health (Parkes and Horwitz, 2016), recognizing these as fundamental to understanding and responding to health impacts of ecosystem change, including the complex and overlapping impacts of climate change, biodiversity loss, land and water degradation, and food security, from local to global scales (CPHA, 2015).

Third: Ecological determinants of health acknowledge and are informed by other holistic, integrative and Indigenous approaches to health and wellness, recognizing in particular the established leadership of Indigenous approaches in prioritizing integrative understandings of ecological, social, cultural and intergenerational determinants of health (Parkes, 2011; Greenwood et al., 2015). This means holding a commitment both to an inclusive approach that respects diverse knowledges and ways of knowing, and to the challenging but essential work of reconciliation that such understandings and inclusions imply, in the spirit of informed allyship.

In response to the specific educational and training implications of the EDoH, and informed by ongoing interest in this topic at annual conferences of the Canadian Public Health Association, a group of Canadian public health and allied professionals, researchers and educators convened as the Ecological Determinants Group on Education (EDGE). The main goal of EDGE is to promote the integration of EDoH with public health education, training, and professional development, attending to issues of content as well as issues of pedagogy (and the alignment between these), with the intention that this effort will support and inform research, advocacy and policy relating to EDoH. As it commenced its work in 2015, EDGE identified the following objectives for its work, to:

- Advise on the development and delivery of core curriculum regarding EDoH to be considered ‘minimum standard’ for MPH programs and related graduate training in public health;
- Advise on the development and implementation of continuing professional development activities on EDoH for those already in the field of public health;
- Advise on the development and integration of targeted training and education for health professionals (i.e., trainee doctors, nurses, other health professionals and clinical trainees);
- Identify needs and opportunities for the future development of mechanisms and approaches to building public health competencies related to the Ecological Determinants of Health;
- Undertake advocacy to promote the inclusion of EDoH;
- Enhance practice through creation of spaces (e.g. ‘communities of practice’) for collective deepening of education and training content and pedagogy for those ready to move beyond minimum standards;
- Liaise with NCCAH and others regarding complementary efforts being undertaken among Indigenous peoples.

Informed by priorities identified at pre-conference workshops at the Canadian Public Health Association’s annual conference in 2015, the following three priority areas for integrating EDoH into education, training, and professional development were identified, and led to a decision by the EDGE Steering Committee to focus on these priorities through three Working Groups:

- **Graduate curriculum development for Masters of Public Health (MPH) and related graduate programs (Working Group 1)** including review of/implications for core competencies for public health, recognising that changes to graduate curriculum may involve implementing courses based on EDoH or incorporating new material into courses that are already being offered;
- **Continuing professional development for those already in the public health workforce (Working Group 2)** including identification and/or development of targeted workshops, training activities for those already working in the public health field;

- **Targeted training/education for health care professionals and other disciplines (Working Group 3)** recognising the need for flexible platforms required to incorporate ecological determinants of health into existing curricula and/or work schedules.

As these working group activities progressed, the EDGE Steering Committee sought to document and consolidate insights through an initial scan of needs, challenges and assets deemed relevant to strengthening capacity in EDoH. This involved gathering information from key resources about public health training in Canada (e.g. PHAC, 2016); from websites and resources from established public health initiatives in Canada; and with input and suggestions arising from EDGE Steering Committee and Working Groups, based on personal and professional networks and activities. The scan was conducted during 2017 and early 2018. Findings and insights are presented here in relation to Contextual and Conceptual Challenges (Section 3), and Existing Resources and Training (Section 4).

3. Contextual and Conceptual Challenges

Public health has a long history of responding to new challenges and to revisiting issues that warrant renewed attention. Public health training and education is therefore challenged to continually evolve to accommodate new advances in the field (Public Health Agency of Canada, 2008). The three premises described in Box 1 resonate with calls and challenges for public health to adopt an ‘eco-social’ approach. Hancock notes that *“Because the challenges we face are both ecological and social, and interdependent, we need to adopt an eco-social approach not only in population health promotion and public health but in society as a whole. This means shifting the goal of our society from economic growth and development to human development that is socially just and ecologically sustainable (2015, p. 254)”*

Labonté argued in 1995 that is no longer acceptable for those working in the field of population and public health to be blind to the ecological determinants of health, as has been the case since the advent of population health in the early 1990s (Labonté, 1995). The rapid changes of the 21st century have only increased the need to recognise that social and economic changes are driving ecological changes, and that these in turn are already causing social and economic changes, which will only accelerate.

Bridging the gap between public health education and the increased demand for eco-social approaches, presents both conceptual and contextual challenges, exemplified by the “complexity” of EDoH and ecosocial approaches and “convergence” of ecological determinants of health in relation to other areas addressing ecological, social and health concerns, both within and external to Public Health. These contextual and conceptual challenges are elaborated here.

3.1 Complexity of EDoH and eco-social approaches to Public Health

In spite of the wide range of implications ecosocial factors have for public health, there is too often a call to narrow the focus of training and education goals, which poses challenges when addressing the complex ecosocial issues that are of explicit interest for the EDGE team. An obvious example is climate change, which presents a complex problem for public health professionals to tackle, that is directly related, but not restricted, to the ecological determinants of health. The health sector is impacted by climate change through an increased risk of foodborne and waterborne diseases, higher risk of injury and disease due to fires and extreme heat waves, increased risk of under-nutrition due to diminished food production in disadvantaged regions, increased risk of vector borne diseases, and an increase in already high numbers of disease and deaths caused by air pollution, and mental health impacts (CPHA, 2015; Friel, Butler and MicMichael, 2011; Fritze et al., 2008; Watts et al., 2015). In order to understand these impacts, there is a growing need to focus not only on direct pathways of impact, but also to address the complex interrelated pathways of influence between climate, ecosystem change and health equity (Poland and Dooris, 2010; Friel et al., 2011; Watts et al., 2017). Effective responses that take account of this complexity, align with the work of unusual allies (in social movements, civil society, and elsewhere), draw on diverse ways of knowing and doing, and that embody reflexivity, are called for. Education and training on EDoH that fuel ecosocial understanding, have the potential to respond to this need.

3.2. Convergence internal and external to public health:

Another important challenge and potential asset, when considering education and training for ecological determinants of health is the challenge of convergence with other related fields. We recognise two types of convergence for the public health community to consider in relation to ecological determinants of health:

Convergence *internal* to public health relates to the ways in which EDoH, and related ecosocial approaches touch on needs, interests and emerging awareness across multiple dimensions of public health. This includes overlaps

between traditional health protection (associated with the profession, practice and field of environmental health) and health promotion (traditionally associated with social-ecological approaches). The (eco)systems orientation of EDoH overlaps with communicable disease (e.g. emerging infectious diseases) and non-communicable/chronic disease (e.g. green-planning initiatives to foster active living). Some of these ideas are explored in work developing in the context of ecological public health (Chu and Simpson, 1994; Rayner and Lang, 2012). This convergence also represents an increasingly well recognized opportunity to emphasize the co-benefits of addressing the EDoH in terms of addressing multiple public health goals (e.g. active transportation reduces greenhouse gas and criteria air pollutant emissions, and is associated with increased physical activity and reduced obesity, although active transport users may face increased risk of injury from MVC and be exposed to elevated levels of air pollution (Reynolds, Winters, Ries and Gouge, 2010); this illustrates the complexity of – and the need for -- an eco-social approach).

Ongoing social and ecological change also means that public health agendas are converging with agencies external to public health and which will demand partnerships and engagement outside the health sector. This is a reality that demands working alongside other professional sectors (planning, land and water management, emergency preparedness etc.); with non-health Ministries and municipal governments; with usual and ‘unusual allies’ in civic society (e.g. environmental organisations, social justice movements, and niche innovations); and with the emerging green/sustainable and social enterprise entrepreneurs in the private sector. While public health can provide an important perspective and leadership within the health system, we also need to support those experienced partners from other disciplines and fields that, in many cases, will appropriately continue to take the lead in the wider community and society toward the healthy, just, sustainable future we aspire to (CPHA, 2015; Hancock et al., 2015).

Continuing social and ecological change also mean that the public health community will, increasingly, need to engage with, and be informed by a range of approaches seeking to understand and respond to the health implications of social and ecological change. As argued by Buse et al (2018), the public health community is challenged to become familiar with synergies and overlaps with emerging fields such as ecohealth and ecosystem approaches to health (Parkes and Horwitz, 2016; Webb et al, 2010), one health (Zinnstag, 2010), biodiversity and health (Romanelli et al., 2015), and the rapid emergence of research, educational and policy initiatives emerging under the banner of planetary health (Whitmee et al, 2015), as well as a convergence of social movements such as Transition Towns, permaculture, relocalization, degrowth, slow food, maker culture, sharing economy, indigenous political resurgence, and other social movements (Klein, 2014; CPHA, 2015).

Recognising these different challenges, and in keeping with our aims, the next section explores existing resources and training considerations as a platform for future development.

4 Existing Opportunities and Training

Given that the specific framing of EDoH is relatively new for public health, it is not surprising that there is a lack of standardized training in EDoH for those pursuing training and professional development in public health. Alongside the work of EDGE, a scan of the curricula of schools of public health has been published (Yassi et al, 2017) that identified, among other things, weaknesses and gaps with respect to the EDoH. Among the 76 graduate-level programs in Canada, only 17% required at least one course related to environmental health and a mere 3% had at least one required course related to the environmental determinants of health. For the 23 faculties and schools 78% offered at least one course in environmental health, while only 52% offered at least one course that touched on the environmental determinants of health. For comparison, courses on the social determinants were required in 25% and offered in 78%.

Our scan of needs, assets and challenges can be seen as complementary to work by Yassi et al (2017), and other recently emerging work seeking to understand the scope of education and training relevant to Ecological Determinants of health. In presenting this work, we have distinguished two interrelated types of opportunities related to university courses (Section 4.1) and Continuing Professional development (Section 4.2), which are both discussed below. A Summary/overview of these different options is provided in **Table 1** “A matrix of options for integrating Ecological Determinants of Health into education strategies” (below).

Table 1: A matrix of options for integrating Ecological Determinants of Health into education strategies

Ecological Determinants of Health: A Scan of Needs, Challenges and Assets

Type of student/ learner ⁽¹⁾		Undergraduate	Graduate (Masters, PhD)	Professional Trainees: health/health care focused ⁽²⁾	Professional Trainees: non-health focused ⁽³⁾		
Type of Course/Educational initiative							
Formal University/ College Courses (Section 4.1)	Required Courses	Embedded within other required courses		<i>See Box 2 (draft competencies)</i>	<i>Via competencies as part of health professional curriculum?</i>	<i>Less likely but potentially via a stream e.g. Public health and planning? or other Interdisciplinary/inter- professional options</i>	
		Stand-alone required courses	<i>See Appendix B</i>	<i>See Box 2 (draft competencies)</i>			
	Elective courses	EDoH embedded within other courses	<i>See Box 2 (draft competencies)</i>	<i>Appendix B</i>	<i>See Box 3</i>	<i>See Box 3</i>	
		Elective EDoH courses	<i>See Appendix B</i>	<i>See Appendix B</i>	<i>See Appendix B</i>	<i>See Appendix B</i>	
		Independent/ Directed Study Courses	<i>Ad hoc, developed between profs and students. More likely in Inter/transdisciplinary/inter-professional courses. May link to field courses</i>				
		Field Courses	<i>See Appendix B: depending on orientation could work for all types of learners especially in Inter/transdisciplinary/inter-professional courses</i>				
		Internships /Practicums	<i>Less relevant</i>	<i>Concentrated at MPH level and tending to reflect student- driven foci of interest.</i>	<i>Inter/transdisciplinary and inter-professional options</i>		
		Entire Program	Mix of elective and required	<i>not yet developed. but proposals emerging, especially in conjunction with Interdisciplinary/interprofessional options</i>			
Continuing Professional Development (CPD) and other Career Development (Section 4.2)	In person	Within Conferences	<i>Sessions within conferences continue to be a main focus for CPD options e.g. CPHA annual conference</i>				
		Workshops	<i>Some examples emerging for in person workshops– stand-alone or linked to workshops see Appendix C</i>				
	Online	Interactive Webinars	<i>Online resources are relevant and accessible to all types of learner See Appendix C and D</i>				
		Online resources	<i>n/a</i>	<i>See Appendix C and D</i>	<i>See Appendix C and D</i>	<i>See Appendix C and D</i>	

Notes:

- (1) K-12 Education is not included in this table but, increasingly, arguments are being made to think of this as part of the spectrum of initiatives needed
- (2) Professional Schools: health/ healthcare focused, could include Medical Schools, Nursing Schools, other Allied Health Professional schools (social work, physiotherapy, other)

Clearly a full appraisal of the range of options presented in Table 1, is beyond the scope of this initial scan. Even so, the following Sections present the results from our initial scan, focused on University Courses and EDoH (Section 4.1) and Continuing Professional Development and EDoH (Section 4.2). These insights and further information

elaborate on many of the sections of Table 1, and are supported by further details and examples provided in Appendix B ([Examples of courses or programs in Canadian universities with an orientation directly relevant to the Ecological Determinants of Health](#)), Appendix C ([Examples of Canadian Resources potentially relevant to Education, Training and Professional Development in EDoH](#)), and Appendix D ([Selected resources from international-oriented organisations, with potential relevance to Education, Training and Professional Development in Ecological Determinants of Health](#)).

4.1. University courses and the Ecological Determinants of Health

University courses comprise a foundational aspect of public health training, through undergraduate programs, graduate programs (particular Masters of Public Health) and also specific courses that enable public health concepts to be introduced into other programs, and professional degrees. Our initial scan sought to identify key ways in which university courses are beginning to respond to the need for training in EDoH. The sections below highlight EDoH as a component of public health courses, in relation to existing environmental health courses, and the emergence of new courses that are more explicitly oriented to ecological determinants of health. The findings below are supported by some preliminary tables and examples of new course offerings explicitly relevant to EDoH (see: **Appendix B**).

Inclusion of EDoH as a component of existing Public Health courses.

When considering the introduction of EDoH into public health training, a major challenge is recognition of the scope of public health training contexts in Canada, given the rapid expansion of public health schools and MPH programs over the past few years. In their study enumerating public health schools and students in Canada, Jung et al. (2015) describe a two-fold increase in the number of undergraduate and graduate public health students over the past 5 years. This study also identified that of 32 universities in Canada there are 36 faculties offering public health-related programs, with 17 universities offering an MPH program: reflecting a threefold increase since 2003 (Jung et al., 2015). This background work by Jung et al. (2015) highlights that public health training, while crossing disciplines and contexts, is mostly focused on developing curriculum that is essential for current public health practice. While on one hand, this means that the programs offered must provide the essential knowledge and competencies to carry out traditional (and current) core public health functions (Jung et al., 2015), this also means that current training of public health professionals may not be well-matched to respond to emerging public health issues and needs – such as those required to respond to the rapidly developing challenges associated with EDoH, and especially at the interface of social and ecological determinants of health.

Incorporating EDoH concepts into existing public health courses (e.g. within MPH and health-oriented BSc/MSc programs) is one option for providing an understanding of this topic and it may stimulate interest in post-graduate specializations or other continuing education programs.

A range of strategies to increase EDoH content in public health education were identified, including:

- include **introductory/foundational content** for inclusion into existing core public health courses e.g. including use of the CPHA Discussion Document (2015) as a required reading in public health related courses such as health promotion, determinants of health, environmental health, international/global health, Indigenous health, healthy cities/communities, and community nutrition;
- **Increase options for electives or field-courses** relating to the ecological determinants of health, and the creation of EDoH “niche” interest groups for student mentorship by faculty in these areas (see **Appendix B** for examples).
- Build a suite of **case-studies and examples** that demonstrate the nuances of EDoH, including the overlaps and linkages between EDoH and SDoH as articulated in Box 1 e.g. a notable example is the mental health implications of climate change, through interacting social, ecological and cultural dynamics, an area that has tended to be overlooked by traditional environmental health training (see Willox et al, 2011; Harper et al, 2012; Clayton et al., 2017).
- incorporate explicit attention to **EDoH into revisions of Public Health Competencies (Box 2)**.

Box 2: Integrating EDoH into revisions of Core Competencies for Public Health: A proposal ⁽¹⁾

As there are many methods in which individual programs can choose to imbue the EDoH into existing or new curriculum, an approach like the Core Competencies for Public Health can be taken. From a post-secondary education point of view, this method has proven successful to ensure future public health professionals are equipped with the necessary knowledge to improve community health and reduce health inequities. Schools and programs of population and public health can take these competencies and develop learning outcomes that can be used to shape curriculum. Further, these competencies form the basis for design of continuing professional development learning modules to ensure those practicing in public health continue to build expertise on the EDoH. Note: these proposals for Core Competencies are in draft form⁽¹⁾

1. Explain the over-arching domain of knowledge contained within the ecological determinants of health.
2. Apply systems thinking to identify the health implications of an ecological issue.
3. Relate the ecological determinants of health to the social determination of health and social inequities in health scholarship and practice.
4. Explain the links between ecological processes and globalization including global, political, economic and social drivers of ecological change.
5. Describe the ways in which global power relations and structures, in addition to political, economic, and social processes, determine and influence ecological health.
6. Identify appropriate values and articulate key ethical issues shaping and influencing ecological public health priorities and approaches.
7. Demonstrate knowledge about and the ability to enhance public health capacity in leadership, governance, intervention, advocacy and communication responses to ecological issues as well as how to form respectful alliances with activists and other advocates for social and ecological justice.

⁽¹⁾ **Box 2** was prepared and shared for feedback at the Public Health 2018 conference (May 2018) by EDGE Working Group 1, [focused on Graduate curriculum development for MPH and related graduate programs, and core competencies](#). Working Group Co-Leads: Andrew Papadopoulos & Maya Gislason. Members: Donald Cole, Susan Cox, Warren Dodd, Lindsay Galway, Craig Janes, Lesley Johnston, Charlotte Lombardo, Wanda Martin, Jeff Masuda, Lindsey Vold, Lauren Wallar, Annalee Yassi, Mary-Jane Yates.

In order to support strategies (including the implementation of the proposed Core Competencies, included in Box 2), repositories of learning resources relevant to EDoH are needed, including course outlines, as well as links to key resources, reports, papers, videos and other sources. **Appendix B, C and D** offer an initial set of what is a rapidly expanding set of resources.

Inclusion of EDoH in relation to “Environmental Health” courses

Although, as noted in the three premises in Box 1, we do not consider Ecological Determinants of Health to be the same as Environmental Health, it is clear that courses and training relevant to the field of environmental health offer a particular area where EDoH may be considered, or included, as part of public health training. One aspect of our initial scan was, therefore, to identify university graduate programs that included Environmental Health courses, and to consider the extent to which these courses addressed EDoH.

This initial exploration was supported and informed by the work of Yassi et al (2017) who found that for the 23 faculties and schools in public health in Canada, 78% offered at least one course in environmental health, while only 52% offered at least one course that touched on the environmental determinants of health. For comparison, courses on the social determinants were required in 25% and offered in 78%. Yassi also noted a difference in the level to which these courses were *required* as part of public health degree programs: noting that 17% required at least one course related to environmental health and only 3% had at least one required course related to the environmental determinants of health.

Informed by the Public Health Agency of Canada’s summary of Educational Programs in Public Health (PHAC, 2016), we sought to gain a sense of whether or not considerations of the Ecological Determinants of Health were being incorporated into Environmental Health courses. Our initial work confirmed that establishing this, would require a much deeper level of analysis that our initial scan was able to provide. We did note, however that there is an expanding amount of resources relevant to the EDoH, being included in professional development resources for professionals training in the field of environmental health (see Section 4.2 and Appendix C).

Inclusion of EDoH as a component of training courses for health professionals.

One notable area of development and interest is in the theme of “[Climate Change and Health](#),” which has led to a range of climate change and health curriculum projects being carried out by medical educators (Columbia

University, 2018; Maxwell & Blashki, 2016), with the intent of providing health professionals with the tools and knowledge to understand and respond to the health effects of climate change (Friedrich, 2017). There is extensive overlap between EDoH efforts and Climate Change-oriented initiatives, and there is potential to leverage from efforts to focused on climate change, to feed into training and education efforts focused on EDoH more broadly, on the links between the social and ecological determinants of health and on how to develop and implement an eco-social approach in population and public health.

Another area of rapid development with some overlaps with the Climate and Health work is in relation to ‘Sustainable Healthcare’, including an extensive network of professional development focused on “preparing health professionals to build and work in a sustainable health service” (Sustainable Healthcare Education Network, 2018, see **Appendix D**).

Stand-alone courses directly relevant to Ecological Determinants of Health

Our initial scan also identified a notable emergence of stand-alone courses that were focused on themes directly relevant to the determinants of health. A selection of examples of new courses directly relevant the Canadian context is summarised in **Appendix B**, a table that expanded rapidly during the course of our initial scan in 2017 and early 2018. The rapid development in this area means that this list will rapidly become outdated. The following examples highlight the the rapid and ongoing expansion in this area:

- The ongoing expansion of course materials and modules provides by the Canadian Community of Health in Ecosystem Approaches to Health (<http://www.copeh-canada.org>). These resources have been informed by a 10years history of field course and short courses (Parkes et al, in press), including a current format of a multi-site, graduate level course in “Ecosystem Approached to Health (see <http://www.copeh-canada.org/en/key-areas/training-and-capacity-building/course.html>);
- Since 2015 the Dalla Lana School of Public Health at University of Toronto has offered a graduate-level Ecological Public Health course. In 2018 an undergraduate version was added. In addition to core content, the course features a number of different ‘lenses’ through which EDoH can be viewed, including ecological public health, Ecohealth, political ecology, indigenous world views, and others.

4.2 Continuing Professional Development and Ecological Determinants of Health

Educational reform to integrate EDoH into Public Health Practice is not only interested in incoming and new practitioners and researchers, but also those who are already active in their fields and would like to – or need to – learn more about EDoH. Our initial scan therefore sought to define and understand options for “Continuing professional development”, for those already working in the health sector.

Continuing professional development (CPD) is defined here as “formal and informal activities undertaken to maintain, update, develop, and enhance professional skills, knowledge, attitudes, and practice” (Giri et al., 2012). In the context of EDGE, we note that CPD opportunities relate to both those working in Public Health, and also those Health and allied-health professionals whose work has a more clinical orientation, including, but not restricted to doctors, nurses, social workers, midwives, and others.

In the following sections, we identify examples of resources and examples for those seeking CPD options relating EDoH, including courses and workshops and resources available through the National Collaborating Centres for Public Health. An selection of continuing professional development resources identified as potentially relevant to Professionals already working in Public Health are provided in **Appendix C (Canadian)** and **Appendix D (International)**.

Continuing Professional Development in EDoH for the Public Health workforce

A key target audience for EDGE initiatives include partner agencies (Public Health Agency of Canada/PHAC, Canadian Network of Schools and Programs in Population and Public Health/NSPPPH), and those already working in public health (as professionals, policy makers, or other health professionals in health units, or related public health entities).

Identifying CPD options for those working in public health has proved challenging on account of the scope of practice and orientations that could be considered relevant. Public health professionals span a variety of disciplines, working within multiple sectors and different levels of health care and the public health system. The US-based Public Health Online (2017) identifies the following list of professionals working in public health:

- Public Health Practitioner
- Biostatistician
- Medical and Health Services Manager
- Health Informatics Specialist
- Epidemiologist
- Researcher
- Public Health Inspector/Environmental Health Officer
- Health Care Administrator
- Health Educator
- Community Health Worker
- Quality Investigator
- Environmental Engineer
- Health Department Administrator
- Government Policy Analyst
- Health Promotion Coordinator
- Public Relations Manager
- Psychologist
- Psychiatric Nurse
- Trainee Physician
- Physician (public health, infectious diseases, family medicine)
- Nurse
- Breastfeeding Support Coordinator
- Midwife
- Social Worker
- Other health professionals and clinical trainees

With regard to resources and training offered to those already working in public health, our initial searches identified few CPD opportunities to learn and develop skills specifically in the area of the EDoH. Overall, courses currently being offered through Public Health organizations and agencies primarily focus on areas of communicable disease, non-communicable disease, emergency preparedness and response, epidemiology, and other key concepts within public health. As with University courses, it could be possible to factor EDoH into these existing CPD opportunities, but a more likely scenario is that specific activities will be developed to meet this need, including stand-alone CPD activities with an EDoH orientation.

Continuing Professional Development in EDoH for health and allied-health professionals

Although the list of Public Health Professional above includes health and allied-health professionals, the work of EDGE has identified the value in recognising the specific needs, challenges and assets for those whose work overlaps with public health, but has a more clinical orientation, including, but not restricted to doctors, nurses, social workers, midwives, and others. In some cases, CPD resources and opportunities may need to be targeted to specific training demands and opportunities of healthcare professionals. This creates fertile ground for connections with related efforts focused on healthcare professionals. In the Canadian context, this includes, but is not not restricted to:

- Canadian Association of Physicians for the Environment (CAPE): <https://cape.ca>
- Canadian Nurses for the Environment: <https://cnhe-iise.ca>
- Canadian Coalition for Green Health Care: <http://greenhealthcare.ca>

Although health and allied-health professionals may have specific CPD needs, many of the resources and strategies notes below have resonance across the public health and healthcare workforce, and also for those working outside of the health sector but with common interests (see Table 1).

CPD workshops and conference-related activities that address the EDoH

Although we were not able to identify obvious listings of CPD activities in Canada, those involved with EDGE Steering Committee and Working groups identified a series of workshops and CPD opportunities where training and professional development opportunities arose. Notable examples that highlight options that are emerging include:

- **Summer Schools offered by the Public Health Association of BC.** Recent themes include: Facing a Changing World: Transformative Leadership and Practice; included a half day on Planetary Health and Healthy Built Environments (2017); Promoting Health and Sustainability: The case of climate change and energy use (2016), Strengthening Healthy and Sustainable Communities through Local Government Planning and Public Health Collaboration (in partnership with the Planning Institute of BC, 2014), and Recreation and Health (in partnership with the BC Recreation and Parks Association, 2013)
- **Preconference workshops at regional or national public health conferences.** Pre-conference workshops have the advantage of being accessible to those who would already be attending a public health conference. They are often developed by specific groups who propose the idea of conference organisers.

Ecological Determinants Group on Education (EDGE). June 2018.
(2018 V2: Formatting/pagination updated, content unchanged)

One example is a series of pre-conference workshops initiated by CoPEH-Canada in conjunction with a PHAC-funded project, titled “Linking public health, ecosystems and equity through ecohealth training and capacity building” (2013-2015). For these workshops, a 3.5 day workshop model developed by CoPEH-Canada was adapted to a series of even shorter workshops for practitioners held in conjunction with provincial and national public health association meetings and run as one-day Public Health Workshops (Cole et al, in press). The ongoing collaboration across CoPEH-Canada provided the organizational support to engage in these CPD activities beyond university context . Examples of workshops at provincial Public Health Association conferences included:

- Upstream is a Place: Linking Health, Ecosystems, and Society for Public Health (Montreal, August 2014, with Ecohealth2014 conference)
 - Walking the Talk: place, public health, resource use and global change (Richmond, BC, December 3, 2014 with PHABC conference)
 - “Pouvoir et savoir travailler ensemble pour des milieux de vie en santé” [Power and knowledge to work together for healthy environments]. (Workshop at the Journées Annuelles de Santé Publique, 2015);
 - EcoHealth Workshop, on “Realizing the Health Benefits of Green Spaces in a Changing World” (The Ontario Public Health Conference March, 2015).
- **In-conference workshops at regional or national public health conferences.** Since the release of the CPHA Discussion Document (2015) the Canadian Public Health Association has committed to profiling EDoH activities at its annual conferences, through committed parallel sessions in the Conference session.

All three options above (Summer Schools, pre-conference workshops and in-conference sessions) are relatively *ad hoc* and require specific groups to organise and fund the development and delivery of the session. Resources are emerging to support these scenarios (see **Appendix C and D**), but further attention is required to ensure that these *ad hoc* efforts are institutionalised as part of core commitments of CPD options for public health professionals.

EDoH and the National Collaborating Centres for Public Health

In Canada a key source of organisations that provide resources for professional development are the Network of Centres of Public Health. While not undertaking an exhaustive review of EDoH-relevant resources within the NCC’s, our initial scan has noted a range of potential resources and assets below. We have focused on three of the six [National Collaboration Centres \(NCC’s\) on Public Health](#) but not that other NCC’s may also address and produce resources relevant to the Ecological Determinants of Health.

[National Collaborating Centre for Environmental Health \(NCCEH\)](#), is focused especially on the needs of Environmental Health professional. Complementary to the challenges being addressed by EDGE, the NCCEH aims to build capacity through networks of environmental health practitioners, policy-makers and researchers (BC CDC, 2017). The main functions of the NCCEH are to synthesize, translate, and exchange knowledge, as well as identify gaps in research and practice knowledge. Examples of EDoH themes within the NCCEH resources include:

- Archived seminars on [Community impacts of fuel spills](#), with a case study from BC’s Northern Coast
- [Environmental health equity: from the molecular to the global](#), discussing various implications for communities, societies, and public health and other health professionals.
- Repository of upcoming events such as [Ecohealth Knowledge to Action Research Group’s Indigenous Health and Research Weblogue](#)

[The National Collaborating Centre for Aboriginal Health \(NCCAHA\)](#). In keeping with a history of integrative, indigenous-led approaches to the the developments of health, the NCCAHA has championed a suite of resources with relevance to the Ecological Determinants of Health. Notable examples include the landmark text [Determinants of Indigenous Peoples’ Health in Canada: Beyond the Social](#) (Greenwood et al, 2015), which draws on a long history of work to highlight interrelated aspects of the Determinants of Health. Other work includes the emphasis on [“Healthy Land: Healthy People”](#) activities, and a review of overlaps between Aboriginal Health and Ecological approaches in [Ecohealth and Aboriginal Health: A review of common ground](#) (Parkes, 2011). Other resources that NCCAHA has produced with relevance to those interested in the EDoH and ecosocial approaches, include:

- Proceedings report of the national forum [Transforming our Realities: The determinants of health and Indigenous Peoples](#) (NCCA, 2016).
- Publication: [Warming up to the embodied context of First Nations child health: A critical intervention into and analysis of health and climate change research](#) (Parkes et al 2010).
- Report: [Aboriginal environmental health issues: Researchers' and decision-makers' perceptions of knowledge transfer and exchange processes](#) (NCCA, 2010).
- Podcast: [Water: Our First Relative, Our First Responsibility with Dr. Priscilla Steele](#) (2017)

The National Collaborating Centre for Determinants of Health (NCCDH), works to advance the social determinants of health and health equity through public health practice and policy. The NCCDH translates and shares knowledge and evidence to influence interrelated determinants. Throughout the website resource library, the NCCDH provides summaries of projects in development and highlights from related projects. The NCCDH has published resources on intersectoral action and currently provides an expedited systematic review resource titled [Assessing the impact and effectiveness of intersectoral action on the social determinants of health](#) (2012). This resource can be used to understand how public health works with other sectors to intervene on the social determinants of health and advance health equity (NCCDH, 2012). Other resources in the NCCDH Resource Library, as relevant to the EDoH, include:

- [A review of frameworks on the determinants of health](#) (2015), published by the Canadian Council on Social Determinants of Health.
- [Key resources for environmental public health practitioners to address health equity: A curated list](#) (2016)

As well as more classic public health-oriented resources, **Appendix C** also identifies several resources of initiatives that could be relevant for Public Health professionals seeking to learn more about EDoH in the Canadian context. There is also an expanding suite of resources with a focus at the international scale. A selection of internationally-oriented initiatives are presented in **Appendix D**.

Building a culture of EDoH within Continuing Professional Development

Given the scope of public health practice, and the needs identified above, it is challenging to identify standardized options for continuing professional development across the public health community. In addition to the options noted above, other options could include:

- working with organizations who currently offer professional development training, either in person or online, to create EDoH specific courses, easily accessible for those who do not have time to attend in-person classes.
- building on international resources to provide Canadian based content. Since EDGE training and education efforts are primarily targeted towards Canadian universities and professionals within Canada, creating Canadian-specific context and cases could be an important priority for EDGE. For example, although the US Centre for Disease Control (CDC) offers an abundance of public health courses online, they are not applicable to all Canadian EDoH issues. Targeting EDoH education to highlight content relevant to Canada could allow for more in depth understanding when applying public health competencies in the field.
- identifying opportunities for profession-specific training across the wide range of professionals working in the field of public health (e.g. nurses, doctors, public health inspectors, etc.) Examples, drawing on the examples of Climate Change and Sustainable Healthcare, are provided in **Box 3**.

Creating guides and toolkits specific to public health professionals is a possible solution towards building CPD options related to the EDoH. The guide could contain an introduction to the EDoH, key concepts, reference material, population specific areas (e.g. elderly, children, pregnant women, etc.), and connection to resources provided by partner agencies and other organizations involved in implementing EDoH focused.

Box 3: Profession-Specific resources: Climate and Health and Sustainable Healthcare.

The [Center for Climate Change and Health](#) (California, USA) has created a [physician guide](#) to climate change, health and equity. It provides physicians with a multi-faceted perspective on climate change and health, and the burdens and impacts on health equity. The guide is meant to be used as a reference tool for physicians who encounter climate change related health problems. The topics addressed in the guide range from extreme heat to air quality, and also provide special topics pertaining to specific populations such as children, workers, and pregnant women (Center for Climate Change & Health, 2017).

[Health Care Without Harm](#) is an international organization that has created a [Nurses' Climate Change Toolkit](#). The toolkit is an overview of nurses' role as advocates for protective environmental policies, as well as in responding to air pollution and climate change and provides accompanying resources.

The World Health Organization offers a [health and climate change toolkit for project managers](#). Intended for planners, policy makers and those working in the policy and practice interface, this toolkit contains key resources addressing climate change and health issues.

A related area that extends beyond the realm of Climate Change can be found in the rapidly developing area of Sustainable Health Care. The [Centre for Sustainable Healthcare](#), based in the UK has an expanding array of resources and networks for doctors and allied professional groups seeking to mainstream sustainability within clinical areas so that it is integral to the planning of health systems and the practice of healthcare professionals. This is supported by work in [medical education](#) and in [carbon modelling](#) of clinical care. A related EU initiative [NurSus](#) focuses on resources to enhance Sustainability Literacy and Competency (SLC) in nurse education by developing innovative teaching and learning approaches and materials.

Self-directed resources and online training options

Another important continuing professional development option (and also relevant to university-based training) are the range of self-directed online materials and resources. The examples of resources and initiatives within Canada (**Appendix C**) and with an international focus (**Appendix D**) provide a sense of the expanding potential here. A key area of action for EDGE is to continue to expand and share these and related resources through an online presence, while also connecting with and profiling existing resources.

One area of self-directed Continuing Professional Development are Webinars (live and Archived) that provide opportunities for individuals and groups to engage and learn during the work hours, and/or :

- Climate Health BC : Climate Change Health Policy Group runs a “Learning call” series for members: <http://www.climatehealthbc.ca/>
- CoPEH-Canada, runs an EcoHealth in Action [Webalogue](#) series. Ongoing since 2014, this Webalogue (webinar+ dialogue) series aims to highlight the variety of ways in which a range of practitioners, professionals, policy-makers and community members are grappling with topical, current and complex issues emerging at the nexus of population health, ecosystem and society.
- International Association for Ecology and Health runs an occasional [Webinar series](#)
- NCCEH have a series of [Webinars](#) focused on Environment and Health topics, some of which are relevant to EDoH
- The [Security & Sustainability Forum](#) is a US-based public interest organization that produces learning events about climate security, which we define as the threats to society from a changing climate and related disruptions to natural systems.
- US- Environmental Protection Agency runs a [Water Research Program Webinar Series](#)

This is an incomplete list of a rapidly expanding resources, supported by networks and entities such as those presented in **Appendix C and D**. The range of webinars, podcasts and related online options are expanding rapidly, and are likely to provide a expanding list of self-directed resources in the future. There is an ongoing need for platforms of shared resources that can serve the expanding need for CPD in EDoH, and contribute toward well-designed, effective and practical resources for those interested in EDoH at different stages in their careers.

5. Synthesis and Recommendations

A number of strategies were recommended by the Canadian Public Health Association in their discussion paper (2015), “Global Change and Public Health: Addressing the Ecological Determinants of Health,” to provide guidance and recommendations for targeting the EDoH (CPHA 2015). This document has expanded on these proposals, presenting a range of considerations for the Public Health community (especially in Canada) to consider to ensure that the EDoH are recognised as central to education, training and capacity-strengthening for the future public health workforce. We consider that attention to EDoH, alongside SDoH, is a necessary contribution to 21st century public health training and practice, reflecting the greater ecological literacy required to address public health implications of rapid eco-social change.

The foundational work of EDGE has identified important premises for understanding EDoH (Box 1) in relation to Public Health practice, and has underscored the imperative for public health to be proactive and assertive in envisioning EDoH as an integral aspect of public health education, practice and policy. Our initial scan has highlighted a range of needs, challenges and assets relevant for public health professionals and organizations seeking to address the EDoH as a essential component of an integrative, eco-social approach to public health education, research and practice.

The work of EDGE has also highlighted the scope of potential educational strategies, initiatives and priorities that need to be considered when seeking to weave Ecological Determinants of Health into the range of Public Health Education and Practice (see Table 1 and Appendices). The information included in this initial scan underscored the range of options that EDGE and other groups may consider when seeking to expand educational options to foster attention to EDoH.

Given the challenges of the Anthropocene (Whitmee et al., Hancock, 2015), attention to Ecological Determinants of Health can no longer be considered a ‘nice-to’ but is a ‘need-to’ that will push public health to bring out its best responsive, proactive and collaborative tendencies. This is important work and an essential aspect of why public health matters today.

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Appendices

Appendix A: Recommendations on Education from the 2015 CPHA Discussion Paper

Appendix B: Examples of courses or programs in Canadian universities with an orientation directly relevant to the Ecological Determinants of Health.

Appendix C: Examples of Canadian Resources potentially relevant to Education, Training and Professional Development in EDoH

Appendix D: Selected resources from international-oriented organisations, with potential relevance to Education and Training in Ecological Determinants of Health

Appendix A Recommendations on Education from the 2015 CPHA Discussion Paper

Understand and address the ecological determinants of health

Educate public health professionals about the ecological determinants of health:

- Update Canada's set of Core Competencies for Public Health to give greater prominence to the ecological determinants of health, ensuring that public health practitioners have the ability to address both the ecological and social determinants of health;
- Revise the curricula in Canada's Schools and Programs of Public Health to reflect a broader understanding of population health and its determinants, incorporating core concepts or courses that address the ecological determinants of health and links with social determinants;
- Encourage awareness of combined approaches to ecological and social determinants of health that will align public health with a range of existing movements spanning environmental, Indigenous, conservation, labour, social justice, climate change efforts, etc. and;
- Include learning of a wide range of change-oriented practices employed by diverse actors involved in complexity science, community organizing, social practice theory, interdisciplinary work on governing societal transitions, transformative learning, Theory U, generative dialogue, etc.

Extracted from Appendix D: From Ideas to Action (CPHA 2015)

Canadian Public Health Association (CPHA). (2015). *Global Change and Public Health: Addressing the Ecological Determinants of Health*, Canadian Public Health Association Discussion Paper. Retrieved from <https://www.cpha.ca/discussion-paper-ecological-determinants-health>

Appendix B: Examples of courses or programs in Canadian universities with an orientation directly relevant to the Ecological Determinants of Health.

University *	Program	Course	Level
Dalhousie University	Environmental Science	Environment and Human Health	Undergraduate
Lakehead University	Health Sciences	Social and Ecological Determinants of Health	Graduate (Masters in Public Health)
McGill University	School of Environment	Ecological Determinants of Health - Arts	Undergraduate (Bachelor of Arts)
University of Northern British Columbia	Cross-listed: Health Sciences and Natural Resource and Environmental Studies	Field School in Human Ecology: Ecosystem Approaches to Health	Graduate
Université du Québec à Montréal	Doctorat interdisciplinaire en santé et société	Santé, société et environnement.	Graduate
University of Toronto	Dalla Lana School of Public Health	Ecological Public Health	Undergraduate and Graduate
		Planetary Health	Graduate
	Department of Geography	Building Community Resilience	Undergraduate and Graduate
University of Waterloo	School of Public Health and Health Systems	Ecological Determinants of Health	Undergraduate
Western University	Biology	Ecosystem Health	Undergraduate

*Listed in Alphabetical order by university. In addition to these Canadian examples, there are many courses arising in other countries. An incomplete sample of these include:

- Brunel University London (UK) has a planetary health track in the new undergraduate “Global Challenges” degree program.
- Cornell University (US) incorporates planetary health into its “Master of Public Health” program.
- Deakin University, Melbourne (Australia) has a [Health and Sustainability](#) Undergraduate Degree Stream, linked to the [Health, Nature and Sustainability Research Group](#)
- The University of Copenhagen School of Global Health (Denmark) integrates planetary health into its Master of Disaster Management program.
- The Yale School of Public Health (US) offers an online certificate program on “Climate change and health”.
- The University of Miami (US) is developing a graduate program “Master of Science in Climate and Health”.

Appendix C: Examples of Canadian Resources potentially relevant to Education, Training and Professional Development in EDoH

(listed in alphabetical order)

Provider	Resource (i.e. webpages, webinars, website repository, etc.)	Description/Platform
British Columbia Centre for Disease Control	Health Equity and Social Determinants of Health Resources for	BC CDC provides a number of resources for PH Practitioners in the field of environmental health such as BC’s Guiding Framework for Public Health

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	Environmental Public Health (EPH) Practitioners	
	Through an Equity Lens: A New Look at Environmental Health	Through an Equity Lens is a project that aims to increase knowledge of health inequities related to the natural and built environment, develop resources to incorporate equity into environmental public health practice, identify options to integrate environmental health equity considerations into health system policies in BC, etc.
Canadian Community of Practice in Ecosystem Approaches to Health (CoPEH-Canada)	Ecosystem Approaches to Health Teaching Manual	COPEH-Canada offers The entire CoPEH-Canada Ecosystem Approaches to Health Teaching Manual, containing 8 modules, available as a PDF in English, French and as an abridged version in Spanish.
	COPEH-Canada Course on Ecosystems Approaches to Health	The COPEH-Canada Course is a hybrid, multi-site course on ecosystem approaches to health. This course is available to graduate students from all disciplines and also to professionals interested in these themes. This part online, part face-to-face graduate level course on ecosystem approaches to health was offered at two sites: the University of Guelph and the University of Northern BC in May and June, 2017.
Ecohealth Knowledge to Action Research Group	Webalogue series	The Ecohealth Knowledge to Action Group is a group of learners, researchers, and collaborators located at the University of Northern British Columbia. A series of dynamic webalogues was launched in 2014, and aims to highlight the variety of ways in which a range of practitioners, professionals, policy-makers and community members are grappling with topical, current and complex issues emerging at the nexus of population health, ecosystem and society. Access to archived recordings is available.
EcoHealth Ontario	Resources , events, training	EcoHealth Ontario (EHO) is a collaboration of professionals in the fields of public health, medicine, education, planning and the environment. We are working together to increase our understanding of the relationships between environment and health with the aim of finding ways to increase the quality and diversity of the urban and rural spaces in which we live.
National Collaborating Centre for Aboriginal Health (NCCAHA)	Resources and publications highlighting Approaches to Aboriginal and Indigenous Health that can inform Ecological Determinants of Health	<p>Parkes et al (2010). Warming up to the embodied context of First Nations child health: A critical intervention into and analysis of health and climate change research</p> <p>Parkes, M. W. (2011). Ecohealth and Aboriginal Health: A review of common ground.</p> <p>Greenwood et al (2016). Determinants of Indigenous Peoples' Health in Canada: Beyond the Social.</p> <p>Transforming our Realities: The determinants of health and Indigenous Peoples (Proceedings report of the national forum)</p> <p>Report: Aboriginal environmental health issues: Researchers' and decision-makers' perceptions of knowledge transfer and exchange processes</p> <p>Podcast: Water: Our First Relative, Our First Responsibility with Dr. Priscilla Steele</p>
National Collaborating Centre for	Resource Library with documents containing publications that	A review of frameworks on the determinants of health (2015) , published by the Canadian Council on Social Determinants of Health.

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Determinants of Health (NCCDH)	include EDoH approaches	Assessing the impact and effectiveness of intersectoral action on the social determinants of health (2012). Key resources for environmental public health practitioners to address health equity: A curated list (2016)
National Collaborating Centre for Environmental Health (NCCEH)	eJournal Club	The NCCEH eJournal Club is a series of informal hour-long sessions that provides a format for discussing and appraising peer-reviewed articles relating to environmental health.
	BCCDC/NCCEH Environmental Health Seminar Series	The BCCDC/NCCEH Environmental Health Seminars Series provides an opportunity for learning and knowledge exchange on a variety of environmental health topics. The seminars can be attended in-person or online. The sessions are conducted in English, and are recorded for later viewing. Participants are eligible to receive CIPHI Continuing Education Credits.
	Various Workshops and Presentations	The team at NCCEH regularly presents at environmental health events across Canada in addition to organizing workshops and meetings on various developing topics. A select listing of presentations made at conferences and other meetings are available here .
Public Health Association of BC	Summer Schools	Recent themes relevant to EDoH include: <ul style="list-style-type: none"> ● 2017 - Facing a Changing World: Transformative Leadership and Practice; included a half day on Planetary Health and Healthy Built Environments ● 2016 - Promoting Health and Sustainability: The case of climate change and energy use ● 2014 – a two-day section focused on Strengthening Healthy and Sustainable Communities through Local Government Planning and Public Health Collaboration (in partnership with the Planning Institute of BC) ● 2013 - Recreation and Health (in partnership with the BC Recreation and Parks Association)
Public Health Ontario	Environmental and Occupational Health Page	PHO provides technical and scientific advice through reports, tools, and OEH Seminar Series

Sources:

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Appendix D: Selected resources from international-oriented organisations, with potential relevance to Education, Training and Professional Development in Ecological Determinants of Health

Source	Resource (i.e. webpages, webinars, website repository, etc.)	Description/Platform
International Association for Ecology and Health (EcoHealth International)	ecohealthinternational.org	The International Association for Ecology and Health, (EcoHealth International), is a scholarly organization with members from all continents. EcoHealth is committed to fostering the health of humans, animals and ecosystems and to conducting research which recognizes the inextricable linkages between the health of all species and their environments. A basic tenet held is that health and wellbeing cannot be sustained in a resource depleted, polluted and socially unstable planet.
	Bi-annual conferences	e.g. EcoHealth 2018
	Webinar series	Download slides and some archived recordings of past webinars.
	EcoHealth Journal Archive	Archives of current and past journals; PDF of editorial content. Papers address integrated ecology and health challenges arising in public health, human and veterinary medicine, conservation and ecosystem management, rural and urban development and planning, and other fields that address the social-ecological context of health.
NurSus	http://nursus.eu/	The aim of the NurSus project is to enhance the availability/relevance of a sound learning offer in Sustainability Literacy and Competency (SLC) in nurse education by developing innovative teaching and learning approaches and materials. Nurses work across borders; the availability of the NurSusTOOLKIT in a number of languages will promote coherency and support a framework for sustainability competencies across Europe.
Planetary Health Alliance	https://planetaryhealthalliance.org	The Planetary Health Alliance (PHA) is a consortium of universities, NGOs and other partners with a shared mission—supporting the growth of a rigorous, policy-focused, transdisciplinary field of applied research aimed at understanding and addressing the human health implications of accelerating anthropogenic change in the structure and function of Earth's natural systems
	Planetary Health Education	Curation of a collection of planetary health teaching materials to serve as a rich open-access and globally-accessible resource, designed to infuse existing disciplines with planetary health concepts and educate the next generation of planetary health scholars.
Sustainable Healthcare Education	https://networks.sustainablehealthcare.org.uk/network/sustainable-healthcare-education	A network of students and educators interested in preparing health professionals to build and work in a sustainable health service.
World Health Organization	Climate Change and Human Health programme	The programme's webpage incorporates current and past events, and other resources, including: <ul style="list-style-type: none"> - Global Climate and Health Summit - Second Global Conference on Health and Climate - Climate Change and Health in Small Island Developing States: WHO Special Initiative in Collaboration with UNECCC Secretariat - Health Policy and Climate Change - Climate Change and Health Toolkit - Ecosystems and health framework - UN Millenium Ecosystem Assessment - Documents and resources on biodiversity and health

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	Public Health, Environmental and Social Determinants of Health (PHE) e-News	Each PHE e-News feature includes convenient links to the relevant topic for more detailed information, a list of upcoming events, recent publications and WHO regional offices
	Health and Environment Linkages Initiative (HELI)	HELI is a global effort by WHO and UNEP to support action by developing country policymakers on environmental threats to health

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- NurSus (2018) Sustainability Literacy and Competency in Nurse Education <http://nursus.eu/>
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