Introduction

The multiple and diverse environmental challenges of the 21st century require new ways of thinking across all disciplines, including social work. What is becoming unequivocal is that ‘global warming and climate change will have wide-ranging effects on the environment, socio-economic, and other related sectors including health’ (Singh and Purohit, 2014: 112). The nuances of these effects are and will increasingly take the form of extreme weather events including heat waves, droughts, ocean acidification, species extinctions, and erratic rainfall patterns leading to water shortages in some areas, and flooding in others (Haines et al., 2006; Bowen and Friel, 2012; Hens and Stoyanov, 2014; Anderko et al., 2014; Hoy et al., 2014; McMichael et al., 2006). Additionally, alongside these changes in the physical environment is the projected rise in zoonotic and vector-borne illnesses (Ebi et al., 2006; Sachan and Singh, 2010; Goodman, 2013), the majority having no pharmaceutical interventions available.

Ebi et al. (2014: 1318) provide a broad parameter of questions that begin to engage with these environmental challenges:

What are the current environmental stresses and issues that form the backdrop for potential additional impacts of climate variability and change? How might climate variability and change exacerbate or ameliorate existing problems? What coping options exist that can build resilience to current environmental stresses and also possibly lessen the impacts of climate change? And finally, what are the priority research and information needs (near and long-term) that can better prepare . . . policymakers and the public to reach informed decisions related to climate variability and change?

Such questions require a larger scope of investigation, transdisciplinary in nature, reviewing existing theories and frameworks in natural and social sciences for points of intersection, and increasingly investigating ‘the whole’ as well as the nuances of the parts (Krieger, 2008, 2012). This chapter follows Krieger’s lead and is anchored in a strong belief in transdisciplinary research and practice, informed by theories and models that encompass epidemiological (e.g. ‘One Health’) and socio-epidemiological models of social, physical, and environmental determinants.
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of health to provide critical points of knowledge necessary for social work in the 21st century. This perspective supports Dominelli’s (2012) green social work lens with its emphasis on interdependency and interrelatedness in investigation of environmental matters.

Five stories worth telling: images, narrative, and thinking outside the box

Environmental investigations, whether involving the natural or social sciences, need to broaden in scope. Five stories told through videographic narratives highlight out-of-the-box thinking, and suggest where transdisciplinary perspectives could be effective. These five stories uniquely emphasise the intersection of environment, species, socio-economic, socio-political and/or inter- and cross-species health.

The first video investigates the intersection of poverty, economic development, and environmental health. University of California, Berkeley student Khalid Kadir produced the video based upon a book by Timothy Mitchell (2002). Mitchell’s book, *The Rule of Experts: Egypt, Technopolitics and Modernity*, describes the Egyptian malaria epidemic of 1942, the narrow problem definition (the mosquito), and expert technical interventions that exacerbated the environmental degradation of the region (see www.youtube.com/watch?v=8jqEj8XUPlk). The video highlights the dangers of single-discipline experts looking only downstream at a specific problem, and using only their expertise rather than integrating multidisciplinary upstream approaches investigating possible environmental and socio-political dimensions.

The second and third videos involve animals with specific instinctual characteristics used to work alongside humans for the betterment of all species. The first of these two videos highlights the humane use of rats in Mozambique to detect landmines (see Bomb sniffing rats saving lives in Mozambique at https://youtu.be/H1O_vtfX1sY), the results of which have enhanced the lives of all species inhabiting the area. The second is the use of gaggles of ducks for pest control in the South African wine industry (video, The Quack Squad, at https://youtu.be/H6Ehoxu9QY8), rather than using toxic pesticides to contaminate the land. These short segments emphasise cross-species collaboration producing positive outcomes for humans, animals, and the fauna and flora of geographic regions.

The fourth video emphasises the work of a young veterinarian in Uganda specialising in mountain gorillas. Although her primary concern is the mountain gorillas, her research and practice expanded to include protecting humans against zoonotic disease, specifically the spread of Bovine tuberculosis through infected cow’s milk; the Ebola virus through eating infected bush meat; Marburg hemorrhagic fever from exposure to bat reservoirs; and among her own patients, protecting the gorillas from scabies and tuberculosis from human reservoirs (see www.pbs.org/frontlineworld/stories/uganda901/). Her work shows the complexities that face healthcare providers at the artificial intersection of species divides.

The fifth video highlights the nuances of the worldwide AIDS pandemic – one that has all but been forgotten in some Western countries. The four-hour series, *The Age of Aids* (www.pbs.org/wgbh/pages/frontline/aids/) traces the roots of the global AIDS pandemic: the zoonotic origins; epidemiological investigations conducted by research centres in the United States (US), Belgium, and France; global socio-political and socio-economic disruptions; healthcare concerns; sociological biases (e.g. race, gender, sexual orientation, ethnicity, occupation [sex workers]); overlapping disease transmission reservoirs (IV drug use); and health practices (unprotected sex) that contribute to the evolution of the disease. Most sobering about the series is the realisation that the AIDS pandemic is not unique in the unfolding of zoonotic and vector-borne illnesses, as the recent Zika virus exemplifies. The video series provides a road map for future environmental and health challenges anticipated from microbial vector acceleration due to climate change.
A transdisciplinary approach for environmental challenges

The enormous complexity of climate change and expected effects on the social, physical and biological environments (Hens and Stoyanov, 2014), necessitate research and intervention collaborations of disciplines in natural and social sciences, alongside other related and non-related fields. Such collaboration provides an interlocking weave so as to better understand the multiple dimensions of environmental degradation, multi-species health, and disproportionate environmental justice concerns. Dominelli (2012) highlights the importance of crossing disciplinary and professional boundaries in green social work to emphasise this point. Expanding traditional disciplinary boundaries allows for a taxonomy of environmental concerns to be expanded at the nexus of a new scientific paradigm. Green social work is a current example, and can be further developed and redesigned through its coproduction processes and transdisciplinary perspective (Dominelli, 2012).

Transdisciplinary research and practice is often associated with medical and primary health research and practice (Benesh et al., 2015; Lobb and Colditz, 2013) as well as disaster social work (Dominelli, 2012, 2017). This framework has facilitated the investigation of environmental health, negative environmental exposure, and environmental justice (Dominelli, 2012; Betz et al., 2014). The strategy encompasses broad input, and has also enabled the involvement of indigenous voices and religious/spiritual leaders who embrace animism within their spiritual and cultural heritage (Darlington, 2007; Harvey, 2006; van Schalkwyk, 2011; Wallace, 2012; Dominelli, 2012). Evidenced by the tree-ordination ceremony involving the ordaining of trees as ‘Buddhist monks’, actual Buddhist monks designate trees as sacred in ritual and role, thus preventing the mass deforestation of northern Thailand through logging. Conservation acts supported by animism have allowed Thailand to reforest its depleted ecosystem (Darlington, 1998). Green and mainstream social workers can learn from such examples.

What is transdisciplinary research? The Washington University School of Medicine describes this as ‘team science’, where ‘scientists contribute their unique expertise but work entirely outside their own discipline … striving to understand the complexities of the whole project, rather than one part’. Dominelli (2017) utilises this approach in green social work, adding that the team includes community residents in developing a common theoretical framework, concepts, values, objectives, and processes for proceeding to solve problems. Transdisciplinary investigations ‘transcend their own disciplines to inform one another’s work, capture complexity, and create new intellectual spaces’ (www.obesity-cancer.wustl.edu/en/About/What-Is-Transdisciplinary-Research). The Harvard School of Public Health defines transdisciplinary research as ‘efforts conducted by investigators from different disciplines working jointly to create new conceptual, theoretical, methodological, and translational innovations that integrate and move beyond discipline-specific approaches to address a common problem’ (www.hsph.harvard.edu/trec/about-us/definitions).

Green social work interrogates its methodology through critical, reflexive approaches to research, practice and education (Dominelli, 2017) and asks questions like: How is transdisciplinary collaboration different from multidisciplinary, and interdisciplinary approaches? Although subtle, the differences are profoundly important in setting the tone and direction for collaborative investigation and practice. Multidisciplinary research involves ‘researchers from a variety of disciplines working(ing) together at some point during a project, but having separate questions, separate conclusions, and disseminating in different journals’ Interdisciplinary research is described as ‘researchers interact(ing) with the goal of transferring knowledge from one discipline to another … allowing researchers to inform each other’s work and compare individual findings’ (www.obesity-cancer.wustl.edu/en/About/What-Is-Transdisciplinary-Research). Given the complexities of environmental concerns, moving towards broader research and practice
approaches is beneficial, and may yield the greatest success in conservation, adaptation, and mitigation when responding to environmental crises. Meanwhile, multidisciplinary strategies are invested in asking larger questions and seeking holistic answers. These should be explored and viewed as informing key features in the development of a ‘toolkit’ that targets collaborative possibilities and key interventions. Such a toolkit would involve multiple disciplinary theories, best practices, various datasets, as well as the narratives of those most directly affected.

**Unique risks for clinical health professionals and social workers**

Like clinical health professions such as public health, medicine, and veterinary services, social work is at the interface of the first responder and health exposure in all manner of environmental disasters such as hurricanes and floods, the emerging health risks through zoonosis and vector-borne diseases like AIDS, Ebola, and Zika, as well as alongside ‘man-made’ environmental emergencies including oil spills, fracking, water and air pollution, and toxic chemical releases. Multidisciplinary, interdisciplinary, and transdisciplinary efforts directed towards reducing environmental exposure and assessing risk and impact, should include the multidimensionality of the socio-political and biophysical determinants, and emerging environmental determinants of health across all species and locations.

While limited by an ‘interdisciplinary’ lens, Addy et al. (2015) instance inter-professional training that involves social work, nursing, pharmacy, public health, and medicine. This mandated curriculum endeavour is now required in public health programmes in the US. Such programmes would likely be applauded by Pockett (2014) and Fish and Karban (2014) who argue that social work should include the broad concept of ‘health’ at the centre of its curricula. Green social work includes the planet’s health alongside that of all living things – people, plants, and animals (Dominelli, 2012). Gorin (2002) and Moniz (2010) would also agree with these authors for arguing that social work is uniquely positioned to collaborate with public health, as social work operates in the upstream, midstream, and downstream dimensions of health assessment and interventions, while emphasising the macro-, mezzo-, and micro-dimensions of social issues.

**Getting our bearings: investigating the environment through a public health lens**

Any public health taxonomy includes levels of investigation across social and physical determinants of health. A broad public health taxonomy has categories and sub-categories within a framework of upstream, midstream, and downstream domains including government policies and programmes, categories of communicable, non-communicable disease, and injury elements that provide a theoretical perspective on particular issues (Knickman and Kovner, 2015). Significant indicators in the overall health of individuals, families, neighbourhoods, and communities are considered foundational for designing appropriate interventions.

In the public health model, upstream elements involve ‘preventing ill health, protecting populations from health threats, and improving and promoting health’ (Goodman, 2013: 50). Attention to social and health indicators at the upstream level are expansive and can transform societies (Brownson et al., 2010; McKinlay, 1998; Padilla et al., 2016). In Europe and the US, 20th-century life expectancy improved drastically as a result of upstream factors. Frieden (2010: 590) notes that these included ‘universal availability of clean water, rapid declines in infectious disease, broad economic growth, rising living standards, and improved nutritional status’.

Figure 27.1 visually represents the Canadian Integrative Model of Population Health and Promotion. It combines domains of health determinants, levels of action, and comprehensive action.
strategies that add texture to the contexts of potential points of intervention and impact. The intersectional points in the three domains provide the most significant aspects in upstream, midstream, and downstream determinants to benefit overall human health.

Added in Figure 27.1 is the Canadian ‘domain of social determinants’, showing downstream determinants. While specific to how Canada conceptualises health/social determinants, it represents potential baseline determinants in other international (e.g. the World Health Organization) and national categorisations of social factors (e.g. United States Center for Disease Control’s Healthy People 2020 initiative; Baum and Fisher, 2010; Brownson et al., 2010; Bunyavanich, and Walkup, 2001; English et al., 2009).

The intersection of ‘climate change’ and ‘environment’ could interface with health determinants in physical environments, biology, and genetics. This approach leaves open the weaving of environmental variables into research and practice investigating the impacts of various environmental health concerns (Bell and Edwards, 2015; Daley et al., 2015; Houghton, and English, 2014; Samarasundera et al., 2014).

Typical traditional uses of such models include social epidemiological research and practice involving social inequities, social relationships, social capital, and work stress (von dem Knesebeck, 2015). Merzel’s and D’Afflitti’s (2003) work in community-based AIDS health promotion exemplifies this. Expansion of analysis into the physical environments and biological and genetics determinants, allows for research and practice models to investigate areas like disproportionate exposures to health risks in rural environments, especially in subsistence hunting and fishing activities (Gotchfeld and Burger, 2011) as well as the provision of health promotion and care to migrant farm–worker families in high environmental exposure environments where there is excessive use of agricultural pesticides (Connor et al., 2010). Also, an analysis of upstream issues that create lethal downstream health outcomes is illustrated by the legacy of lead-tainted drinking water in Flint Michigan (Greenberg, 2016; Rosner, 2016).

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**Figure 27.1** Canadian integrative model of population health and promotion

*Source: adapted from the Public Health Agency of Canada (available at www.phac-aspc.gc.ca)
Investigating through a social epidemiological lens, health vulnerability, interventions, and assessment frameworks must deal with the very real impacts of climate change. Numerous scholars (Ebi et al., 2006; McMichael et al., 2006; Walker, 2009; Hens and Stoyanov, 2014; Hoy et al., 2014) have contributed to designing models for investigating particular environmental issues. Regarding climate change, Bowen and Friel (2012: 10) ‘outline the relevance of climate change adaptation to global health, highlight the importance of linking social determinants of health and sustainable development agendas with climate change adaptation measures, and investigate global health and climate change activities’. Additionally, these authors describe financial mechanisms for adaptation in developing countries. For example, Haines et al. (2006) investigate climate change and human health from three perspectives: current associations between climate change and infectious diseases that are vector-borne; the effect of recent changes in climate including heat waves, flooding, droughts; the evidence base for projecting future impacts of climate change on health including investigating changes in disability adjusted life years (DALYs); and climate scenarios relative to climate-based baselines. Nilsson et al. (2012) also provide research that explores the nuances of how public health fits into overall global climate change agendas related to human health.

A One Health lens for environmental health

The One Health lens is a developing model that investigates environmental and health determinants at intersections with medicine, veterinary science, and public health. The definition of such collaboration put forth by the One Health Commission states, ‘One Health is the collaborative effort of multiple health science professions, together with their related disciplines and institutions – working locally, nationally, and globally – to attain optimal health for people, domestic animals, wildlife, plants, and our environment’ (www.onehealthinitiative.com). Evidence suggests that this model’s transdisciplinary perspective, not only informs, but could include social work as a collaborative partner. Figure 27.2 suggests how this might occur in practice.

Figure 27.2 identifies three broad areas (animals, aquaculture, and vegetation) of microbial infection and resistance for both animal and humans. Animal, aquaculture, and vegetation are not exclusive categories. Rather, these provide broad visual points of intersection where zoonotic threats, generally referred to as ‘zoonotic disease’ can occur. Sachan and Singh (2010: 520) define zoonotic disease as ‘those that can be passed between vertebrate animals and humans’. Scholars (Degeling et al., 2015; Travis et al., 2014) note that these types of diseases encompass 75 percent of new emerging diseases. They will be most expansive in the coming years, and possibly the most devastating. Types of zoonotic diseases include: AIDS, Ebola, SARS (severe respiratory syndrome), Avian influenza (AI/H5N1), West Nile virus, dengue fever, Rift Valley fever, swine flu, Japanese encephalitis (JE), rabies, leptospirosis, Zika, to name a few. A recent example of cross-species infectious threats was SARS which ‘moved from a natural reservoir, probably bats, to civet cats in animal markets in Guangdong province, China and then carried by infected humans to hospitals in Toronto, Canada’ (Fisman and Laupland, 2010: 111).

The many elements of a One Health model are represented in Figure 27.3.

Figure 27.3 adapts research conceptualised through a ‘One Health’ lens by Zinsstag et al. (2011). The health determinants in this model range from ‘health and well-being in human and animals to systems of biology of humans, domesticated animals, and wildlife across scales from populations to molecules’ (Zinsstag et al., 2011: 153). Additionally, interactions between health determinants and social, cultural, economic, and political elements are included alongside those that investigate the importance of ecosystem health as a whole including soil and vegetation. Zinsstag et al. (2011) provide single subject scholars and those involved in transdisciplinary
Figure 27.2  Flow chart of microbial reservoirs in human and animal interfaces

projects, a framework that is rich in detail and depth of diverse variables for complex environmental research and practice.

To link the visual narratives in Figures 27.1, 27.2, and 27.3, this chapter ends with a brief discussion of the impact of oceans on all environmental exposures. This content area is important, as with a few exceptions, the majority of world’s countries are maritime nations. This underscores the importance of understanding ocean environments and their mutuality for all manner of life.

Scholars have described the various nuances of ocean impact. Topics of exploration include: seafood safety (Marques et al., 2010); sustainability of fishing communities (Clay and Olson, 2008); health of sentinel animals who share the food web with humans (Bossart, 2006; Lafferty, 2015; Fossi and Panti, 2016); agreeing ocean health priorities and regulations in Europe (Fleming et al., 2014); and increases in harmful algal blooms due to ocean cycles and microbial contamination (Moore et al., 2008). Other authors have investigated sustainable governance of oceans including: overfishing; water contamination; oil spills; disruption in coastal ecosystems; integrated watershed management (Costanza et al., 1999); the oceans’ contributions to human health centres in the US (Laws et al., 2008); susceptible populations; media pathways for adverse health outcomes in ocean environments; the microbial effects of flooding (Kite-Powell et al., 2008); and non-point sources of contamination in ocean environments, direct pathogen detection; sentinel species and habitat; non-enteric diseases from water or aerosol transmissions; and zoonotic and emerging diseases (Fleming et al., 2006; Stewart et al., 2008). These investigations only scratch the surface of research still to be done.

Fleming et al. (2015) in their expansive Oceans and Human Health Challenges Report, identify critical factors for ocean health including: climate change, extreme weather, harmful algal blooms, microbes, antibiotic resistance, anthropogenic chemicals, sustainable fisheries, aquaculture, coastal communities, sustainable marine biotechnology, sentinel species, biodiversity, and the significance of views encompassed by One Health. Green social workers should be involved in these
discussions to make their own unique contributions to identifying and resolving issues with their feet embedded in community consciousness-raising and problem-solving (Dominelli, 2012).

**Missed opportunities for practice and research in ocean environments**

In the US, the Ocean and Human Health Initiative (OHHI), launched in 2004, encouraged the integration of public health and ocean research. In the US, centres for oceans and human health were funded by the federal government in five locations: the University of Washington, University of Hawaii, the University of Miami, University of California–San Diego, and the Woods Hole Oceanographic Institution in Massachusetts. These university-based centres have targeted geographies that include ocean environments in the 95,000 miles of coastline comprising the continental US, and the larger Pacific Ocean Basin including the Arctic Sea. Three of the four university-based centres have Schools or Departments of Social Work within their university-wide systems. So far, however, as noted in their research annals, no publication, conference report, or list of inter-professional actors, has included social work personnel in their interdisciplinary investigations. This gap is one that green social workers have been advised to address (Dominelli, 2011).

Taylor (2013) highlights that in 2009, the Social Science Workgroup of NOAA (National Oceanic and Atmospheric Administration) argued for social scientists’ involvement in interdisciplinary research on ocean environments. The location of the OHHI Centers and Sea Grant programmes housed at 35 universities including many with social work programmes, offer social workers possibilities for engaging in environmental research and practice across all levels of social work practice. As oceanographer Sylvia Earle claims:

> even if you have never had the chance to see or touch the ocean, the ocean touches you with every breath you take, every drop of water you drink, every bite you consume . . . drives climate and weather, regulates temperature . . . holds 97 percent of the Earth’s water . . . embraces 95 percent of the biosphere.

(2010: 11)

Green social workers would do well to investigate this subject area.

**Conclusion**

Locating oneself in environmental research and practice is not easy, as it requires practitioners and researchers to venture away from familiar arenas of social work and seek collaborative thinkers from other disciplines to investigate larger phenomena. A ‘One Health’ model is but one framework that can provide a common place to begin to discuss transdisciplinary concerns across health and social dimensions. This chapter argues for social workers to think more broadly as green social workers, acquire knowledge traditionally not taught in social work curricula, and become involved in transdisciplinary research and practice locally, nationally, and globally. It will take knowledge and skills from various professional and community stakeholders to meet the environmental challenges of this century.

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References


