

Global Health, Climate Change and the Environment

A Rights-based Approach

Lund University Centre for Sustainability Studies (LUCSUS)

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LUCSUS, Lund University Centre for Sustainability Studies
LUCID, Lund University Centre of Excellence for Integration of Social and Natural Dimensions of Sustainability

Lead Author
Dr. Vasna Ramasar

Lund, Sweden

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Introduction

The sustainability challenges of our age will be experienced most directly through effects on human health. Sustainability challenges such as climate change, poverty, and water shortages are likely to grow in complexity and extent (Jerneck et al, 2011). Unravelling the complexity of these challenges will require scientists, civil society and policy makers alike to use a systems approach in order to better understand how different parameters influence each other. There is evidence that environmental conditions lead to ill-health (or conversely promote good health) and health can in turn have impacts on environmental conditions (Schiermeier 2007). A 2006 report by the World Health Organisation estimates that almost a quarter (24%) of the global burden of disease is due to environmental risk factors. Environmental factors were judged to play a role in 85 of the 102 diseases considered (Prüss-Üstün and Corvalán 2006). Further, Prüss-Üstün and Corvalán (2006) highlight that in children, 34% of the disease burden were attributable to the environment, and much of this burden is in developing countries.

Climate change, for example, will lead to an increased risk of thermal stress, extreme weather, infectious disease spread and greater prevalence of hunger (McMichael, Woodruff, and Hales 2006; Smith et al. 2014). Ill-health can in turn cause environmental degradation through different pathways, such as increased medical waste, pollution of water resources and poor land management (Ashton and Ramasar 2002). Using the WHO definition, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO 1946). This definition can be extended further to acknowledge that social well-being includes socio-political status and safeguarding of human rights (Agamben 1998). In addressing human health we therefore need to move beyond just the treatment of cases, curative science and directly reducing human exposure (Corvalán 1999). There is currently a heavy focus on technical solutions and economic instruments, often using the metaphor of “war on disease” (Jerneck and Olsson 2011). A recent special issue in *Science*, ‘Global Health: What works’, focuses exclusively on: investments and economic instruments; effectiveness of vaccines, drugs or other health technologies; and innovation and R&D (Jasny et al. 2014). This report recommends an interdisciplinary approach to address the drivers of ill-health and mortality that may be caused by pressures from environmental conditions and driven by broader social, economic and political dynamics. A new focus on social determinants of health and vulnerability has already begun to shift some of the focus away from only the fundamental determinants of health found within a given environment (Tait, McMichael and Hanna 2014). However as we are reaching critical limits where environmental systems and services are being disrupted, our attention must once again return to how we can modify our human-environment interactions. Using the World Resources Institute definition, environment refers to as “the physical, chemical, and biological setting in which people live – in other words, the condition of the air, water, soil and climate” (WRI 1998, 6). For the purpose of this report, the environment includes both urban and rural settings, and can be described in terms of its known utility functioning as both ecosystem resources and ecosystem services.

This report presents an overview of the current discussion on the linkages between health and the environment, with a focus on the serious risk to health posed by climate change. The report concludes by advocating the adoption of a rights-based approach to global health practice in order to move away from the current focus on the pharmaceutical industry and funding agencies in health management, and towards a rights-based approach that puts people at the centre of the global health, environment, and development agendas.

Health and the environment: An interconnected system

Health and environment are intrinsically linked as humans exist in the environment and are therefore exposed to changes in the environment which have consequences for human health. Changes in human health provide feedbacks into the socio-ecological system and can in turn lead to changes in the environment.

The scale of environmental impacts on health may vary from local pollution exposures at point sources, to global scale climate changes (Prüss-Üstün and Corvalán 2006). Kjellen (2001) simplifies the grouping of environmental impacts on human health to those in the home environment, the work environment and the broader environment. Within the home environment, access to water, sanitation and hygiene is one of the biggest global challenges. SIDA (2014) estimated that in 2011, 800 million people in the world lacked access to good quality water and that one-in-three people in the world lacked access to a toilet or a latrine, which, together with poor hygiene, leads to diseases that kill 1,800 children everyday. Housing conditions and indoor air pollution are two other areas where the home environment affects human health (Landon 2006; Saint-Charles et al. 2014). The work environment refers to occupational health and safety exposures experienced by people in their places of work. Meanwhile, impacts in the broader environment can be due to exposure to stressors such as solid waste, climate change, extreme weather events and outdoor pollution.

In the reverse relationship, the state of human health can affect the state of the environment. The impacts of HIV and AIDS will be used to exemplify this. HIV and AIDS-related morbidity and mortality have indirect impacts on the environment such as changes in demand for natural resources as the demography changes, inability to utilise resources (including the loss of capacity for environmental conservation), efficiently and effectively as labour is lost, and increased air, land and groundwater pollution from improper medical waste disposal and burial practices (Ashton and Ramasar 2002). For example, improper disposal of unsterilized medical waste can lead to the dispersal of pharmaceutical active agents, such as antibiotics and hormones, into the environment, and this can feed back into society through the increased risk of the development of drug-resistant opportunistic pathogens entering into the food chain (Verlicchi et al 2012). It is likely that the recent Ebola outbreak in parts of West Africa will have similar impacts on the environment although this has not been well-documented (UNDP 2014).

The burden of disease is unevenly spread across countries and groups in society. From 2002 through 2012, researchers found ischaemic heart disease, stroke, lower respiratory infections and chronic obstructive lung disease to be the top global killers (WHO 2014). HIV deaths decreased slightly from 1.7 million (3.2%) deaths in 2000 to 1.5 million (2.7%) deaths in 2012. Diarrhoea is no longer among the top five leading causes of death, but as of 2012, it still remained in the top 10, killing 1.5 million people in that year alone. Chronic diseases, especially cancers and diabetes, continue to cause increasing numbers of deaths worldwide (WHO 2014). In low income countries, respiratory diseases, HIV and AIDS and diarrhoeal diseases are the top causes of mortality whilst heart disease, stroke and pulmonary disease are the leading causes of death in high income countries (WHO 2014) which illustrates a key difference in the burden of disease between high income and low income countries. While poorer areas are facing an increasing incidence of environmental diseases, nutrition deprivation and exposure to unsafe living environments, the more wealthy areas are experiencing ill-health due to exposures to both pollution and consumption related diseases. Therefore, the socio-economic conditions of people live clearly plays a role in the type of diseases that lead to ill-health and morbidity. Disparities are also tied strongly to inequalities and environmental injustice, with studies showing that poorer communities and people of colour are more likely to reside in harmful environments (Brulle and Pellow 2006). Corvalán et al. (1999) make the point that successful public health interventions acknowledge these differences by concentrating on improving wider environmental and livelihood conditions – an effort that cannot be shouldered by the health sector alone. Addressing health through a combination of environmental and livelihood actions can have important co-benefits. Evidence shows that a large proportion of the environmental disease burden could be averted by existing cost-effective interventions such as clean water, clean air, and basic safety measures (Prüss-Üstün and Corvalán 2006). This can reduce expenditures on the whole for society, in stark contrast to pharmaceutical and other technological means that come at ever increasing societal costs (Castellani et al. 2015).

Climate change setting a new health agenda

Climate change can be considered one of the changes in the broader environment that affect health (Kovats and Butler 2012; Myers 2009). There are systemic, long term risks associated with climate change, which until recently, were not adequately assessed by conventional burden of disease studies (Hales et al. 2014). Often global burden of disease studies have focused on proximal risk factors and historical patterns (Lim et al. 2012), with relatively little attention paid to upstream causes. Burden of disease studies also tend to focus on current exposures rather than future exposure. This has been problematic given the long timescales required by climate change assessments. Climate change therefore poses qualitatively different risks to human health, mainly via upstream and indirect pathways (McMichael 1999; 2013). Due to the slow response of policy makers to halt greenhouse gas emissions, we can also expect climate change to become a more cross-cutting concern in studies of health and the environment. As WHO director-general, Margaret Chan puts it, “Sadly, policy makers

have been slow to recognize that the real bottom-line of climate change is its risk to human health and quality of life” (2009). For this reason, a closer examination of global health and climate change by policy makers is critical.

The Fifth IPCC assessment report (AR5) contribution by Working Group 2 (WG2) devotes an entire chapter (Chapter 11) to human health and notes the increasing research being carried out on climate change and health (Smith 2014). The framework used by the assessment team considered impacts of both direct and indirect exposures, as well as impacts from both economic and social disruptions (Figure 1).

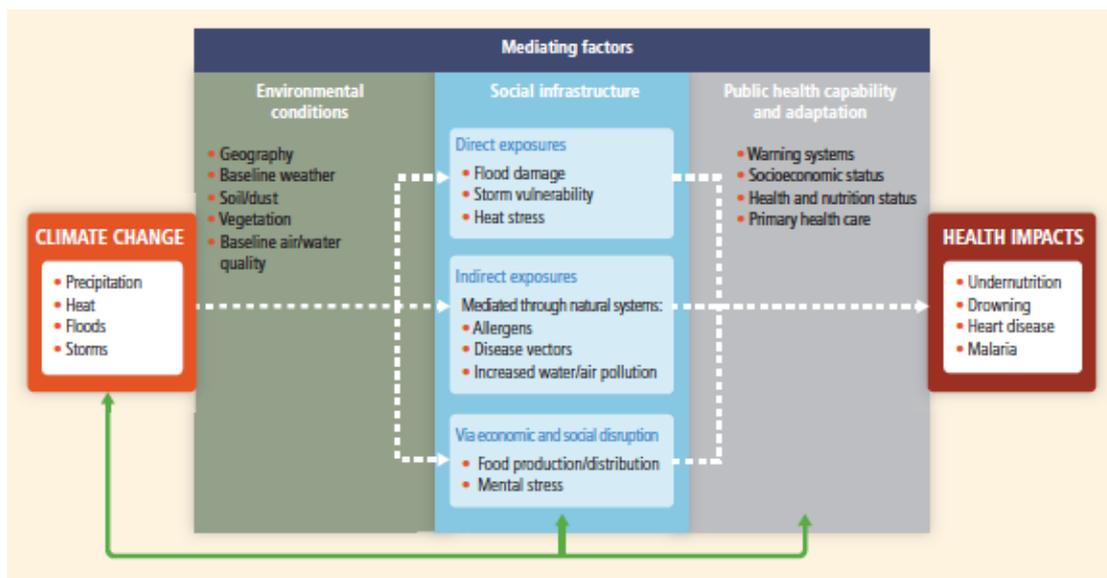


Figure 1: Conceptual diagram showing three primary pathways by which climate change affects health (Smith et al. 2014)

Although there have been many studies of weather and climate on health (proximal risk factors), there are few studies on the impact of climate change itself (Smith et al. 2014). Christidis et al. (2012) concluded that it is “extremely likely (probability greater than 95%)” that anthropogenic climate change at least quadrupled the risk of extreme summer heat events in Europe between 1999–2008. The IPCC AR5 report suggests that “the probability that a particular heat wave can be attributed to climate change is 75% or more, and on this basis it is the likely cause of the excess mortality attributed to the heat wave” (Smith et al. 2014, 720). For example, 15,000 deaths in France alone were attributed to the heat wave event in August 2003 (Fouillet et al. 2008) and 11,000 deaths in Moscow in 2010 were caused by anthropogenic climate change (Smith et al. 2014, 720).

Estimates suggest that excess mortality attributable to heat waves in the eastern United States would result in 200–7,807 deaths/year (mean 2,379 deaths/year) in 2057–2059 (Wu et al. 2014, 10). Similarly, Hajat et al. (2014) estimate, for the United

Kingdom, that in the absence of any adaptation of the population, heat-related deaths would be expected to increase by around 257% by the 2050s from a current annual baseline of around 2000 deaths.

Vulnerability and adaptive capacity to heat stress is noted to be inequitable, and vary from one vulnerable group to another due to such attributes as geography, current health status, age and gender, and socioeconomic status, as well as due to the capacity of public health and other infrastructures to deal with heat stress (Olsson et al. 2014; Smith et al. 2014). How these factors intersect in different circumstances may vary. This is consistent with the cross-cutting issues for climate change and health identified by the National Institute of Environmental Health Sciences (NIEHS). These cross-cutting issues include susceptible, vulnerable, and displaced populations, public health and health care infrastructure, capacities and skills needed and communication and education (Portier 2010). As such, in addressing climate change and health, consideration must be given to the specific needs of each specific vulnerable group.

The IPCC recommends a number of adaptation measures to address health including: improving basic public (and preventive) health and health care services; introducing health adaptation measures and policies such as vulnerability mapping and early warning systems; and addressing the role of other sectors in health adaptation (Smith et al. 2014). The health care service focus is an obvious and necessary element of adaptation to climate change as the present health status of a population is considered to potentially be the single most important predictor of both the future health impacts of climate change and the costs of adaptation (Pandey 2010). The role of other sectors in health adaptation has not often been emphasized and yet can play a significant mitigatory role in health impacts. The IPCC AR5 WG2 quotes a study examining well-established building interventions, which reduce the urban heat island effect (replacing bitumen and concrete on rooftops with more heat-reflective surfaces, as well as introducing more green spaces within the city), and estimates that these would reduce heat-related emergency calls for medical assistance by almost 50% (Silva et al. 2010 quoted in Smith 2014,734). There is thus room to expand adaptation by identifying areas with co-benefits across different sectors that might affect health and climate change.

Co-benefits occur when adaptation strategies have simultaneous benefits for both climate change and health (Sauerborn et al. 2009). These can fall into adaptation benefits but also mitigation benefits. A new World Health Organisation report presented at the April 2015 mid-term review of the European Environment and Health Process last month also highlighted the opportunities for co-benefits when protecting health from climate change (WHO 2015).

An example of a climate change strategy which mitigates the atmospheric concentration of greenhouse gases and also improves health, is to decrease meat consumption (especially from ruminants) and substitute low-carbon healthy alternatives (Smith and Balakrishnan 2009). The power of such measures can be significant. A 2012 article in *Science* (Shindell et al. 2012, 183) identified fourteen measures

targeting methane and black carbon emissions that reduce projected global mean warming ~0.5°C by 2050. This strategy could prevent from 0.7 to 4.7 million annual premature deaths per year from outdoor air pollution, while also increasing annual crop yields by 30 to 135 million metric tons due to ground-level ozone reductions through to 2030 and beyond. Ultimately, the notion of co-benefits brings to the fore the need for a collective and interdisciplinary approach to global health, climate change and the environment. An integrated response will maximize benefits across the board and especially support vulnerable groups.

Global health and the environment: A rights-based approach

Vulnerability to changes in the environment can have a serious impact on social relations. Human action and a history of social inequality leave some people more vulnerable than others (Wisner 1993). As a direct consequence of inequalities, there are distinct differences in people's exposure to ill-health and the capacity to manage it (Tait, McMichael and Hanna 2014). Taking a rights-based approach can help policy makers to view people as rights-holders. The universalism of rights would mean that everyone has a right to certain health and environment conditions, regardless of status. Fulfilment of human rights is an obligation of the duty-bearers, not an act of charity. A rights-based approach implies a shift from the oft-used approaches within the development sector, such as the basic human needs approach, that have regarded beneficiaries of development programmes as passive recipients (Jonsson 2003). Instead, a rights-based approach facilitates health through people's empowerment (De Vos et al. 2009). According to the Universal Declaration on Human Right, everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services (UN 1948). This call does not make specific mention of environmental rights, although some researchers and policy makers interpret the human right to health, shelter, and freedom from hunger as implicitly requiring a healthy environment (Johnstone 1995; United Nations 1991).

Proponents of the rights-based approach currently support three main areas of focus upon which to base the movement towards increased sustainability, (Adebowale et al. 2001; IDRC 2013), namely the right to:

- a clean and safe environment;
- participation in decision-making; and
- protect and defend the protection of the environment and human rights.

The *Draft Principles on Human Rights and the Environment* proposed in the report of the UN Special Rapporteur on Human Rights and the Environment (WHO, 2008) share similar themes including the right to:

- freedom from pollution, environmental degradation and activities that adversely affect the environment;
- protection and preservation of the air, soil, water, sea, ice, flora and fauna, and the essential processes and areas necessary to maintain biological diversity and ecosystems;
- timely assistance in the event of natural or technological or other human-caused catastrophes; and
- preservation of unique sites.

While these draft principles are currently non-binding, they serve as a guide for countries and subnational authorities alike who wish to adopt a rights-based approach. Some countries have already legislated a rights-based approach to the environment in their existing legal statutes. For example, the 1990 Amendment to the Clean Air Act of 1970, adopted by the United States, empowers citizens to enforce its provisions by bringing suit in federal court if and when the federal Environmental Protection Agency (EPA) procrastinated or defaulted in prosecuting violators of the Clean Air Act (Greenbaum and Peterson 2011). In South Africa, the Constitution of the country explicitly includes the right of access to sufficient food and water (van Koppen and Schreiner 2014).

During the 2014 climate talks in Lima, the *Lima Declaration of the People's Summit on Climate Change* called for a rights-based approach to addressing climate change (People's Summit on Climate Change 2014). In preparations for the UNFCCC COP 21 in Paris in 2015, this call for a rights-based approach has been echoed by a letter written by the United Nations Office of the High Commissioner for Human Rights (UNHCHR) to the UNFCCC calling for the new climate agreement to include human rights protection for all (UNHCHR, 2014). Eighteen countries supported this call by signing the *Geneva Pledge on Human Rights and Climate Change* on 13 February 2015 at the UNFCCC's meeting of the Ad Hoc Working Group on the Durban Platform for Enhanced Action (UNFCCC 2015). A rights-based approach to global health, climate change and the environment is gaining momentum and is gradually becoming a global call-to-action.

Everyday interventions to produce health and environment co-benefits

Adopting a rights-based approach to health, climate change and environment can create spaces for everyday interventions that promote healthy environments and human well being. Whilst policy interventions may often take a top-down approach to delivering positive healthcare outcomes, it is important to remember the agency of different stakeholders engaged in everyday practices that mediate interaction between people, their health and their environment. According to the World Health Organisation (2008) human rights do not focus only on substantive issues such as the quality of drinking water or air; they also concern the methods by which these substantive objectives are achieved. To this end, focusing on everyday interventions and various

forms of everyday politics such as social movements highlights the various opportunities for health and environment co-benefits through scientific, economic and societal responses.

By adopting an interdisciplinary perspective, new opportunities can be identified to address issues bridging global health and environmental concerns. Working across every level of society, considering both scientific and economic factors, opportunities for realizing co-benefits can be harnessed. Examples are presented below to illustrate how interventions in different areas can lead to co-benefits for human health and the environment.

Science-to-Action: Waste-to-Value through sanitation and agriculture

The first case serves to illustrate the role of science in contributing innovative solutions that support a sustainable environment and reduce the burden of disease in order to improve human health. Science has a critical role to play in finding sustainability solutions (Kates et al. 2001). However, there is still a need to close the gap between science and society so that solutions are suited to the needs and particular context in which they will be applied. Erhlich, Karieva and Daily (2012,71) challenge the academic community to “be more effective in stimulating innovation, and in testing promising new approaches in major demonstrations that integrate the biophysical, economic and social pillars of sustainability effectively.” One attempt to bridge this sustainability gap can be seen in a recently published study that reveals how urine can be used to enrich soils for sustainable food production. The case study conducted in Uganda is an illustration of one way researchers, working within communities, can find appropriate solutions to both health and environmental needs through addressing food insecurity (Andersson 2015). Ugandan smallholder farmers face challenges as a result of deteriorating soil conditions and poor sanitation conditions (Sanchez 2002). The former leads to threats to food security and sustainable livelihoods whilst the latter can contribute to poor hygiene conditions and spread of diseases. The conventional solution to land productivity is through the large-scale purchase and use of imported, expensive inorganic fertilisers, which are difficult to access (Andersson 2015). Science has shown that human urine can be a substitute resource for plant fertilization, one that is underestimated and underutilized. It has been successfully used in agriculture including in intensive farming systems in various parts of Asia (Goldstein 2012; Netting 1993). Adopting an action research approach, a Swedish researcher working in Uganda, engaged with smallholder farmers to test the use of human urine as a fertilizer on local agricultural plots (Andersson 2015) thus turning a waste product into something of value for rural communities. An iterative process of discussions took place between the researcher and the local community in order to find workable solutions that were socially, environmentally and practically appropriate. The urine fertilizer experiment took place during the cropping season of 2011 from March to August (Andersson 2015). A rigorous experimental design was implemented with the farmers’ nominating an experiment facilitator. Although more long-term study is required to provide conclusive results, the study did find statistically significant

improvements in crop yield with the use of human urine inputs (Andersson 2015). Significantly, the research offered a low-technology solution with limited environmental consequences to the problem of decreasing soil productivity. In the process, the co-benefit of a managed urine disposal system was created. Ultimately, if farmers continue to adopt such practices successfully, the state of the land will not be depleted further and food production will increase leading to better nutrition and livelihoods for the local community. Using science to link environment and health issues can produce creative solutions.

Entrepreneurship through innovation: Smoke-less kitchen

Entrepreneurship has been actively encouraged and supported in a number of sectors and settings throughout the global South, especially in urban areas (Wellings & Sutcliffe 1984; Rogerson 2001; Urban 2008). In the second case, social entrepreneurship was mobilised in a community in Kenya to support individuals to actively promote healthier local environments. This case focuses on an entrepreneur-led initiative to promote improved cookstoves in rural western Kenya and illustrated how a bottom-up market-led approach can bring economic, health and environmental co-benefits (Ness and Åkerman 2015). The problem of indoor air pollution is one which plagues households world-wide (Gordan et al. 2014). Cooking over open fire with solid fuels results in incomplete combustion and indoor air pollution causing respiratory and other diseases that lead to nearly two million premature deaths per year (Jerneck and Olsson 2013, 208). A solution to this dilemma exists through producing flue-piped cookstoves that require less fuel, transfer smoke outdoors and reduce the labour involved in cooking. A local entrepreneur in Kisumu, Kenya was supported (initially by cash and knowledge and then sustained through knowledge transfer) to initiate the production and sale of smoke-less, flue-piped cookstoves (Ness and Åkerman 2015). The cookstoves are produced from local materials and are simple to produce and use (Jerneck and Olsson 2013). The stoves were sold by the entrepreneur to households in rural Nyanza province in Kenya and replaced traditional three stone systems. Although still relying on fuelwood, users of the stoves reported an almost 50% decrease in wood consumption with the new cookstoves (Ness and Åkerman 2015). This led to a reduction in consumption of wood. With the smoke from the stove directed outside the house, indoor air pollution, and resultant health impacts, are significantly decreased. Through this project, over 500 households have adopted the smokeless kitchen stoves, which were sold for approximately US\$14 and thus provided an income for the entrepreneur and the local manufacturers: a potter and a tin-smith. Although the sale of stoves varied from initiation in 2009 until 2014 (Ness and Åkerman 2015), the project illustrates the potential of social entrepreneurship and innovation to offer co-benefits of reducing consumption of environmental resources (wood) while also reducing health impacts from indoor air pollution. As an additional co-benefit, this case illustrated a potential way to create a livelihood opportunity.

Individual leadership and collective societal action: Livelihoods and health through positive living

The third example of everyday interventions to address environment and health focuses on the role of individual leadership and collective social action in addressing local social and environmental problems. In rural western Kenya, widows and divorced women affected by HIV and AIDS have become agents of positive change while also working to improve their households' food and water security (Gabrielsson and Ramasar 2013). HIV and AIDS has been generalized in the populations of southern and eastern Africa and have often led to serious developmental challenges, including loss of income for households, stigmatization of individuals, loss of labour in subsistence agriculture and in some cases, indirect impacts on environmental resources (Ramasar and Erskine 2002). In the Onjiko location, women are rising above these obstacles through individual leadership and collective social action. Working together, the women in Onjiko are gaining increased decision making and bargaining power (Gabrielsson and Ramasar 2013). As a result, they have invested in sustainable innovations such as rainwater harvesting systems and implemented agroforestry practices. The collective action of the women in the region also involves working together in formalized groups that capitalize on the pooling of natural and human resources, which also enables them to use collective financial management systems that help them to survive during hardship periods (Gabrielsson and Ramasar 2013). For example, one Kenyan woman named Jemima, who is living with HIV and AIDS, has opened her household to others living positively so that there are now twelve members to her household. Through her leadership, she has offered support to others who are now working collectively on agricultural production to improve food security and health of their newly shared household. In the process, women such as Jemima are ensuring that their food security, land management and livelihoods are improving. The agency of individuals and collective groups suggest that working together can result in many co-benefits and this has been scaled up and out as the lessons from these successful efforts are shared with the community (Gabrielsson and Ramasar 2013).

The three cases illustrate examples of everyday interventions where considerations of both human health and the environment have been combined to gain a variety of co-benefits by adopting approaches that draw from science, locally based economies and social movements. A rights-based approach to health and the environment would thus benefit from fostering such agency so that rights are interpreted both as the end goal to be achieved and the process of empowerment to uphold rights. Thus, both individuals and communities can be supported and empowered in their efforts to become active participants rather than viewed as powerless victims or passive recipients of pharmaceutical and medical assistance.

A question of rights

This report is a call-to-action with the purpose of advocating for a fundamental rethink of the relationship between global health and the environment. It is critical to see

beyond siloed, narrow, sectoral responses. It is time to explicate the social, economic, ecological and political aspects of both health and the environment to uncover their linkages in order to secure a sustainable future and confront climate change.

Climate change, more specifically, necessitates that we take urgent and effective action in the face of the likely impacts on human health. Climate change has become a systemic challenge that is changing the parameters for both global health and the environment. As, possibly the most urgent concern of our time, the wide-ranging and long-term effects on health and the environment are yet to be adequately understood but the predictions in the most recent IPCC report underlie the need to act swiftly if disaster is to be averted.

Understanding the linkages between climate change and health can inform mitigation (low carbon) and adaptation (public health) policy development (Hales et al. 2014). The opportunity exists to create a vision for climate change adaptation and mitigation that simultaneously enhances global health. Environmental effects on human health and vice versa means that entry points exist into addressing health that utilise expertise and resources from beyond the public health sector alone. Similarly, health-driven responses can lead to reductions in environmental degradation.

Climate change will be experienced most directly by people through impacts on human health and these impacts will be unevenly distributed in societies around the world. It is critical that policy makers at every level in all countries recognise the inequalities inherent in the world today that are exposing our most vulnerable populations to the highest risks and most devastating potential health outcomes. Ensuring we address the rights of these individual to life, health and security will create a minimum baseline of acceptable conditions for all human beings. Establishing a rights-based approach to health will require that policy makers also focus on a rights-based approach to the environment given that an unhealthy environment often compromises the right to human health. At present, there are no formally accepted universal rights to the environment but some commitments do exist through multi-lateral environmental conventions, the declaration of the right to water and other policy instruments. Additionally, there are many countries that have already embedded a variety of environmental rights into their national legislation. A rights-based approach would also necessarily further not only material rights, but also rights to a transparent, open, participatory and empowering approach in order to ensure access to the decision making process by local people so that they can claim and act upon their rights.

The opportunity thus exists to use a rights-based approach to promote interventions on health and the environment while realizing a wide range of economic and societal co-benefits. Bringing science to action, bottom-up entrepreneurship and collective action are examples of ways that communities and individuals alike can realize health and environment co-benefits as illustrated in the cases presented. These cases will hopefully serve to inspire future research and action on a rights-based approaches to global health, climate change and the environment.

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