Towards North-South Interconnectedness: a Critique of Gender Dualities in Sustainable Development, the Environment and Women's Health

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Well-established bodies of scholarship that inform contemporary global debates on gender, environment and health are fundamentally based on dualistic representations of women, such as First/Third World, rich/poor and victim/polluter. In this paper, we argue that recent socioeconomic transitions — affluence in the global South and rising inequality in the global North — demand the development of gender analytical frameworks that better recognize the diversity of roles that women play in the changing global social order that impact on their health. Our paper (a) critiques the dualisms found in three influential bodies of scholarship, namely gender, environment and development, science, technology and society, and sustainable development; and (b) through our critique, conceptually develops an 'interconnectedness' perspective that focuses on the increasingly shared lived realities of women in the North and the South, to understand the emerging complex relationships between gender, environment and health.

Keywords: gender, environment, health, sustainable development, North-South

Introduction

The scholarship on gender and the environment, spanning over four decades, has consistently pointed to the particular vulnerabilities faced by women in relation to the degeneration of the natural environment (WHO, 2004; Roberts *et al.*, 2015; Buechler and Hanson, 2015; Demetriades and Esplen, 2010). The literature strongly associates women's vulnerability to environmental changes as emerging from socioeconomic and political inequalities, so that women experience the greatest disadvantage in places where gender norms are most restrictive. By this reasoning, women in the global South, as poor and rural women, are portrayed as most vulnerable to the effects of environmental degradation. This discourse is deeply entrenched; it is embedded in institutional and grassroots responses to environmental change, forming the foundation for feminist environmental activism and informing current gender-sensitive sustainable development and policy response within key institutions of global governance (UNEP, 2016). Yet, the duality that it is founded on, and which it perpetuates – 'the vulnerability of Third World women' versus 'Others' – is increasingly untenable against the growing recognition of the more complex socio-political transitions taking place in the global North and South.

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The limitations of dualistic framings are particularly relevant to the analysis of women's health, where the public health goals differ for women in the global North and South, such as in the focus on non-communicable diseases (e.g. diabetes, cancer) and communicable diseases (e.g. HIV, TB), respectively. Furthermore, while significant advances have been made in addressing the complex relationships between social factors and disease within global institutions, such as the United Nations (UN), local practice often struggles to integrate medical care from social actions, such as in making links between local conditions (food insecurity, malnourishment and poor diet) and high level processes, such as those embedded in the food production systems (Braveman and Gottlieb, 2014). Paradigms that appreciate more dynamic and complex connections between the North-South are needed to better capture the multifaceted ways in which gender, environment and health are inter-linked in the emerging 21st century global order. This paper has a two-fold objective: it is a critique of dualisms found in the current scholarship informing gender, environment and policy debates, as well as an opening up of discussions on 'interconnectedness' as a new framework for exploring contemporary linkages.

The emerging affluence of economies in the rising South, in the BRICS countries (Brazil, Russia, India, China and South Africa), Latin America and the Caribbean (De la Torre *et al.*, 2015) and growing inequalities and poverty within the North have added multiple challenges to the complexity of simplistic understandings of – and proposed solutions for – the distribution of global gendered health inequalities. As the 2013 UN Development Programme (UNDP) *Human Development Report* notes:

> [t]he South has risen at an unprecedented speed and scale . . . countries of the South are collectively bolstering world economic growth, lifting other developing economies, reducing poverty and increasing wealth on a grand scale (HDR, 2013, p. 1).

Alongside, globally, inequality is also rising both in the global North and South. UNDP's *Human Development Report* for 2015 states that

> A substantial majority of households in developing countries – more than 75 per cent of the population – live in a society where income is more unequally distributed than in the 1990s. Income inequality is also a serious issue in developed countries. Between the 1990s and 2010 household income inequality increased 9 per cent in high-income countries (HDR, 2015, p. 65).

Shifting global geopolitical power relations, as played out in particular in the UN, question the adequacy of a simplistic North-South dichotomy in political alliances, policy preferences and in power brokering. Appadurai (2006) for example contends that relationships between the North and the South are no longer describable by centre-periphery models (p. 296). Instead, he suggests that globalized, complicated reorganizations of people as well as technologies, finances, knowledges and polities are marked by flows and mobilities that simultaneously underpin the similarities and the differences experienced especially by women in these two regions. These flows and mobilities have implications for health, with the patterns of diseases and illnesses, such as their geographical and population distributions and speed of spread, being significantly changed (Landrigan *et al.*, 2016).

These shifting geopolitical and economic developments call, in turn, for a multifaceted understanding of the distribution of global gendered health inequalities that reflect the complexity within and between the North and the South. In the South, women are more likely to be regarded as passive recipients of environmental degradation, with poor health a consequence of toxicity, natural disaster or social restructuring linked to, for example, agricultural modernization and land use changes (Connell, 2012). In contrast, (middle class) women in the North are portrayed as more environmentally conscious, and as active agents in their own wellbeing (Arora-Jonsson, 2011; Resurrección, 2013). Lived experiences are more complex than these constructions suggest. As Arora-Jonsson (2011) notes,

> … [g]ender is thus so much more than poverty and women are not a homogenous category … [a] poor man in India is unlikely to be as polluting as a woman in Sweden or for that matter as much a polluter as a rich woman in India (p. 749).

The vulnerabilities and agency of *affluent* women in the South or of poor women in the North are seldom, if at all, part of this discussion. Health consequences for the most part remain tied to normative understandings that construct an active North-passive South division.

Eschewing dualistic paradigms of women in the South and the North is particularly relevant from a health perspective. Recent profiles on the global incidence and mortality from breast cancer, for example, show almost similar levels in both developing and developed countries (Jemal *et al.*, 2011; Porter, 2008). Exposure to toxic chemical compounds, as found in an array of everyday products, from household cleaning agents, beauty products and plastics, that directly affect the reproductive health of women and children are also increasing *across* global regions (Di Renzo *et al.*, 2015). Similarly, the global casualization of labour increases the physical and mental health exposures of women employed in the bottom tiers of global industrial production (UNEP, 2016). Arguably, there is an urgent need to usher in frameworks that appreciate the complexities within and between the North and the South environmental sustainability and gender. What is required is a new examination of the relationship between gender, health and environment, one that recognizes their interconnectedness.

Our paper is a critical review of three key bodies of scholarship that inform the contemporary analysis on gender, environment and health. These are (a) gender, environment and development (GED), (b) science, technology and society (STS) and (c) sustainable development (SD). These well-established bodies of scholarship each points to the disproportionate effects of global environmental change and environmental degradation on the health of women in the North and the South, given their systemic exclusion from power and consequent vulnerable position in society. Our paper draws on feminist and gender critiques bringing attention to key intersecting arenas of the environment, gender and health in which the changing relationships between economic and political structures in the North and the South are manifest.

The paper is divided into four sections. The first three develop extended critiques of the three bodies of scholarship noted above. This is followed by a discussion that brings together the binary perspectives on health that are implied in this literature. It then develops an argument on interconnectedness in order to frame a more nuanced discussion on the complex interrelationships between women's health, environment and sustainability.

Gender, environment and development

Women, development and environment (WDE)[1] scholarship found a platform in the 1970s and 1980s as part of ecological feminist writings (Daly, 1978; Griffin, 1978; Merchant, 1981; Shiva, 1989, 1994). Blending radical feminist/gynocentric feminism, with historic roots in the peace and anti-nuclear movement, WDE propounded a 'special relationship of women with nature' (Shiva, 1989, p. 43; Gaard, 2011). Its thesis posited a natural continuity between women and the environment drawing a parallel between the exploitation of the environment and that of women. Given their intuitive connection to nature, women were represented as unique bearers of knowledges about local environments and therefore were its natural custodians; and where the task of ensuring the health of their families was regarded as an important function for women within this relationship. The natural/feminine was the counterpoint to development/masculine as the latter established itself through hierarchical processes that were essentially violent to women, people of colour, animals and the natural world. This violence was established through social processes like domesticity, enslavement, hunting, militarism, science and technology, and was legitimated through political institutions, religious organizations, language use and culture (Gaard, 2011, p. 30). The Chipko Movement in India and the Green Belt Movement in Kenya, for example, were upheld as evidence of women's resistance to the pressures of masculinist development agendas in contrast to feminist preservation of nature.

Ecofeminism and its variants have however been subject to extensive criticism. Its foundational arguments of women's biological links to nature as a counterpoint to patriarchal modernization unravelled against criticisms of reductionism and essentialism. Criticism was also made about the

limited attention given to differences among women – caught, as it were, in 'a single ground of hierarchy and a single solution to domination, a reduction which is fundamentally misconceived, insensitive to difference, and blind to exclusion' (Plumwood (1992) cited in Gaard, 2011, p. 40; see also Baker, 1993). In the context of the South, Jackson (1993) advances a thorough critique of WDE. Women, she notes, are affected by environmental change not so much by the fact of being women, but by the fact of being *poor women* – it is the intersection of class and gender which determine women's needs, in turn influencing their reliance on natural property resources, such as forests and the marine environment. This intersection is augmented further by caste considerations (Jackson, 1993, p. 1949). Also, as Jackson argues, situating women outside of gender relations was a misunderstanding of women's 'special relationship' to nature. Women's preservation of natural resources stemmed not from some intrinsic biological connection to the environment but, rather, was necessitated by the need to conserve resources that they used for family subsistence.

The biological determinist arguments of WDE were subsequently tempered, following criticism of essentialist constructions of women and nature (Baker, 1993). A turn towards 'social ecofeminism' or 'feminist environmentalism' argued for women's closeness to nature on the grounds of material and social links to women's gender roles as carers and nurturers (Agarwal, 1992, 2010; Buckingham-Hatfield, 2000; Plumwood, 1992) including that of 'health managers' through their 'domestic work, through cleaning, sweeping, drawing water, washing clothes, dishes and children, and preparing food' and through providing 'tonics, herbal extracts, poultices, ointments and oils' (Kettel 1996, Roberts, 2015).

The feminist environmentalist perspective or social ecofeminism has figured more prominently in current academic and activist discussions of women's roles in climate change and environmental debates, where it underpins the growing calls for climate justice that centres on women (Denton, 2002; Terry, 2009, Mary Robinson Foundation, 2017). Climate justice campaigning focuses on different health implications for men and women especially where there is limited access to (or control of) land, labour and finance (UNEP, 2016). A rights-based agenda, which, when applied to issues of health, focuses on the ways in which gender roles and relations create gendered exposures to risk and vulnerabilities to environmental changes (Buckingham-Hatfield, 2000; Dankelman, 2010; Demetriades and Esplen, 2010; Whittenbury, 2013; MacGregor, 2009; Denton, 2002). Consequently, the erosion of their local biophysical environmental spaces has significant ramifications for the health of communities, and more particularly, women in poor communities. In rural settings, the loss of natural biodiversity has adverse implications for those who live off the land through loss of food and medicinal sources, and through longer time spent on procuring subsistence needs such as water and fuel which are considered to be women's work. Recent studies point to the adverse long-term effects on women's bodies from carrying heavy head-loads including that of water (United Nations, 2016). In urban settings, the combined effects of pollution, toxic sewage and inadequate housing and sanitation increase risks of gastric and respiratory diseases. Household air pollution through open fire cooking using unsafe fuel sources such as wood, charcoal, dung and even plastics disproportionately affect women and children given that they spend more time within the household leading to premature deaths estimated in the millions (United Nations, 2016).

The adoption of the feminist environmentalist perspective into sustainable development discourses is not without critics. The emphasis on women either as rational resource users or as vulnerable victims of degradation, especially in the UN policy framings, are especially subjected to criticism (Arora-Jonsson, 2011; Resurrección, 2013; Sultana, 2009; Terry, 2009). In response, an array of intersectionality approaches are emerging in feminist scholarship that take account of relationships between race, gender, class and other social categorizations interacting to produce differential conditions of access and impacts, inclusions and exclusion (Buechler and Hanson, 2015; Kaijser and Kronsell, 2014). Such intersectional analyses go beyond the fixity of social categories to subjectivities where gender is performed and constituted through practices and discourses, thus, making identities and relationships 'contingent and fluid' (Sultana, 2009, p. 428). In her study of water use in Bangladesh, water accessibility and use are contingent on age, marital status, wealth and role in the family and community, denoting far more socio-spatial and human-nature complexities than

can explain health impacts purely by the broad categories of gender, race or class. Intersectionality analyses therefore not only draw attention to the futility of approaches based on binaries and homogenization, but they also demonstrate why there are competitive interests among multiple emancipatory movements. Gender, indigenous, environmental and health interests are all neither uniform nor aligned, and also they are often contradictory in intent and competitive in practice (see case studies in Jasanoff, 2004; Kaijser and Kronsell, 2014).

Although intersectional analyses offer a more nuanced understanding of the complex connections between women, society and nature, we argue that they do not capture the changing nature of global geopolitical relations between the South and the North and its impacts. Where intersectional analyses have been carried out in the global South, they have tended to focus on community-based, often rural, contexts locally defined, and usually around issues of gender equity. Despite the immense potential offered by an intersectionality framework, we argue that it does not go far enough to understand the varied roles and relations of women in the transformations witnessed in the South, and its implications for health and the natural environment.

Consumption is a case in point. Unsustainable patterns of consumption and its impacts on resource depletion and waste generation are major issues from a sustainable development perspective. However, there is very limited focus on changes in women's roles and linkages to consumption in the gender, development and environment debate. It figures to a limited extent in literature from the North, where women are constructed as conscientious consumers (Arora-Jonsson, 2009, 2011) but in the South, women as consumers largely remain ignored. Yet, in the South, a fast-growing middle class (Ravallion, 2010; Credit Suisse, 2015) has been driving high levels of consumption, and much of it is described as unsustainable (Knorringa and Guarín, 2014). We argue that women play a key role in this process of change. If we consider traditional gender accounts of the heteronormative family, in both developing and developed countries, women are primarily responsible for household purchasing. Furthermore, driven by global trends in marketing and advertisements on media, women-centred products are increasingly becoming a significant proportion of mass consumption – for example, beauty products such as skin-whitening agents, or sanitary accessories, which have detrimental effects on the environment. A similar example can be drawn from changes in production relations. Capitalist production is positioned as antithetical to the interests of sustainable development when understood in its strong form (Baker, 2015). Yet, in many contexts, women – given their advantages to capitalist production – are unwittingly the conduits of its destructive systems.

The multiplicity of roles that women, and indeed men, play as producers, consumers, waste generators, and so on, and the varied ways in which they impinge upon – as much as they are affected by – the natural environment, is complicated by changing social structures in both the South and the North. These examples evoke the complex nature of the flows articulated by Appadurai (2006) and offer a realistic lens to appraise the lived realities within the South and the North. These framings of women are absent in the current literature (as in UN discussions of sustainable consumption) and are areas where the literature needs to extend its analysis, for example, to better understand how women's health is shaped by their changing roles as consumers of products that generate ill-health.

Science technology society (STS) literature

Another key body of work informing perspectives on gender, health and the environment is the STS literature. Emerging in the 1960s as an expansion to science and technology studies, STS is an interdisciplinary field that examines the philosophies of science and the social production of scientific and technological knowledge and expertise. It highlights the interplay, and frequent disparities, between scientific 'truth' and 'social realities'. STS spans a wide range of applications and critiques; at one level, STS has been particularly concerned with identifying the divide between science and society, such as in the construction of medical and health knowledges (Krishna, 2014). Ecological and biomedical concerns contain ethical, social, political components that cannot be reduced to

purely traditional, deductive, scientific enquiry (Yearley, 1985) and as such, STS seeks to integrate social understandings into science. At another level – particularly evident among feminist scholars – STS challenges the very dualist foundations on which science knowledges are built. It considers the relationships between different knowledge systems and concepts, and the ways in which people and health are linked together through politics and power relations. Given the focus on gender, our emphasis is on the latter perspectives of STS. This includes examining the relationships between dominant western scientific biomedical knowledges and other (lay, indigenous and gendered) knowledges.

Undeniably, scientific, biomedical and technological progress is a significant area of global change (WHO, 2004; Krishna, 2014). Science has been very good at generating knowledge about environmental change, particularly when diverse disciplines have linked together in interdisciplinary fora; for example, scientific knowledges have contributed to explanations of changes in disease prevalence and spread (WHO, 2004). The importance of the scientific agenda is also reflected in global plans such as the UN Action 21 and Agenda 2030, which point to the key role for science in the realization of sustainable development goals (UN Scientific Advisory Board, 2014). Science has also a critical role in setting the global sustainable development agenda, for example, the UN Sustainable Development Goals on Good Health and Wellbeing (SDG 3) anticipate targeted and timetabled increasing life expectancy and reductions in some of the common killers associated with child and maternal mortality through policies that are evidenced by epidemiological data. Attention to science and technology can highlight developments that appear to bridge the gaps between the social world and science, between the public and scientists, local and global contexts. For example, technologies, such as mobile phones used to share agricultural information or to diagnose illness, are identified as a positive tool to assist in the management of environmental and health problems and thus in poverty reduction (Schafer et al., 2016).

STS practitioners assembling positive attributes of applied science are often highly critical of the effects of technological solutions like geoengineering, proposed for dealing with climate change (Rose, 2007; Yearley, 1985). Scientific knowledge can be fraught, as science does not wield absolute knowledge and is subject to uncertainty. The dominance of scientific knowledge has meant that status has been given to quantitative measures of health and to the determination of risk at the expense of work on the social meanings of health. Where measurable health outcomes are the focus, this can lead to a narrowing of understandings of health. What is believed to be confidently known about the environment or disease at one time may be later contested. Science can make mistakes, create new environmental, medical and social problems, such as nuclear waste or antibiotic resistance or the social cost of renewable energy and biofuel production (UNEP, 2016) and it can reduce biodiversity (for example as a consequence of genetically modified pest-resistant crops) (Baker, 2015). In the STS critique of biomedicine, the focus on physical bodies and environments plays down the social and gendered conditions of people's lives (Parvathamma and Sharadamma, 1965; UNEP, 2016).

STS also advances social and gender interests. The foundational claim of STS is that the nature/culture binary 'where culture stands for (active) masculinity and nature for (passive) femininity' (Neimanis, 2014, p. 27) represents the exclusion of women from science and biomedicine. In a critique, Anne Fausto-Sterling (2000) proposes that nature itself offers a wider range of possibilities than realized by a traditional gender binary; and that culture often prescribes the material, recognizing that bodies and nature are profoundly shaped by culture. Other approaches have gone further by breaking down traditional binaries between knowledge (biomedical/lay; objective/subjective; science/value; human/non-human; nature/culture). An illustration of this would be the extent to which gendered cultural practices can materialize as disease. Examples include different bone density for women as a consequence of less physical activity for girls, and higher rates of lung disease for working class labourers (Alaimo, 2010; Neimanis, 2014).

A second key claim of STS is that the dominance of western biomedicine reflects downward flow of science knowledge to the South. This can be counted in terms of the numbers of scientists per head of population, average expenditures on science, number of registered patents, and records in the indexed scientific literature, reflecting 'substantial difference in accumulated scientific knowledge

about the two regions and their current unequal capacities for generating new knowledge' (Karlsson, 2002, p. 57). In medical research, this downward shift resonates with a transfer of focus on non-communicable over communicable diseases in the South. STS theorists argue instead for close and critical attention to the processes that lead to such substantial differences. In extension, feminist STS approaches have recognized the bifurcation of knowledges along a North-South divide where the inequalities between women in the global North and South are naturalized and accepted as part of the conditions of womens' lives. The UNEP (2016) points to a significant data gap in monitoring and assessment of research in both local (i.e. poisoning among populations affected by goldmining in the Amazon) and global (i.e. health effects of agricultural pesticides) contexts. The recent UNEP (2016) report on *Global Gender and the Environment* takes as its main goal the incorporation of a gender perspective into environmental understandings of the effects of ecological change on gender; but its emphasis is on the South. Some STS theorists have raised concerns about the transplantation of biomedical and technological solutions from the North to the South because of the risk of creating new dependencies and vulnerabilities, as well as the suppression of indigenous or traditional knowledge systems (Tuhiwai-Smith, 1999). Some STS academics and postcolonial scholars have also argued for a more radical approach based on two-directional flows (that assign value to knowledges emanating from the South also), promoting south-south collaborations (Mouton, 2003). There is also a recognition that the 'deficit approach', wherein the South is seen to lack knowledge or skill, is not wholly representative of the South (Mouton, 2003), with countries like India ranking among the top countries globally in the size of its scientific community (Karlsson, 2002; Krishna, 2014). Similarly, bodies such as the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) sets an agenda for the inclusion of indigenous and local knowledges (ILK) in 'all aspects of its work' (Roué *et al.*, 2016, p. 4).

The science agenda has increasingly been shaped by a global economy, facilitated by the growth of international research collaborations, shift from academic to commercial enterprises, from market-separate government centres, to transnational corporations and commercialized knowledge (Ramachandran *et al.*, 2000; Agarwal, 1992; Karlsson, 2002). The impact on science and biomedicine of global economic growth and investment has been vast, with the emergence of new centres for scientific research or collaborations with large conglomerates and public and private institutions in the North and the South (Sáenz, 2005), reflected in global increases in the numbers of scientists, funding and research areas (WHO, 2004). Strong links have been made between science investment and health; while some point to a complex relationship in which economics drives gendered access to biomedical developments (i.e. such as the availability of infertility treatments to those who can pay, rather than on need) (MacBride-Stewart and Simon-Kumar, in press). There is however substantial debate about how the economic environment is affecting knowledge exchange between the North and the South (Baskaran and Boden, 2004; Krishna, 2014). As Krishna (2014) has noted, the 'Global Forum for Health Research has concluded that 90 per cent of the world's health research is spent on research into problems that only affect 10 per cent of the world's people (p. 143). In addition, in the case of countries like China and India 'science and technology policies in the last two decades, has increased income and wealth for a section of the people ...' (p. 23) (see also Li-Ming *et al.*, 2016; Baskaran and Boden, 2004). Traditional and indigenous science caution the appropriation of such knowledges into commercial profits for control by multinationals and question whether the economic concerns of the global scientific agenda may distract from issues of poverty (Agarwal, 1992). Certainly the goal of many indigenous movements is to promote 'ecological values needed for a healthy environment on which community livelihoods may depend' (Roué *et al.*, 2016, p. 13), including by using traditional knowledge on the management of natural resources. For example, Navdanya – a global seed-saving movement – explicitly works with gardening-dependent women to maintain healthy and productive seeds for food sources where livelihoods and human health are threatened by scientific and commercial goals of biopiracy and genetic engineering (Shiva, 2016).

Thus, in our second critique of the binaries that shape health, gender and the environment we have focused on science and technology knowledges and practices, because of their central role in sustainable development policy. STS approaches note the inflexibility of biomedicine and science in

its capacity to manage indigenous and local knowledge systems. The consequences may be an underestimation of the burdens of environmental and technical change alongside gaps in knowledge about impacts on women. We argue that there is a need to draw attention to the changing social and political contexts and knowledges affecting gender and environment relations. These changing North-South relationships are occurring at a time when the organization of medicine, its practices, knowledges and systems, is also undergoing significant change, particularly in the North. Not only has the global distribution of diseases changed, but biomedicine itself is also being shaped by processes that reflect economic intensification, and expansion of technologies and their associated risks, and a diversification of the health care profession, often leading to fragmentation in delivery. Arguably, the impacts on poor and vulnerable women of changing environmental conditions are masked by discourses of medical progress, technological innovation and scientific breakthroughs. In response, STS scholars suggest that to avoid a scientific tendency towards reductionist and binary thinking, research must better understand the complex flows between science/technology, society, nature and culture (Ramachandran *et al.*, 2000, p. 97).

Sustainable development literature

The central focus of sustainable development (SD) is on society and the many processes that seek to reconcile the ecological, economic and social dimensions of life. SD adds the notion of development to the ecological idea of sustainability, and in doing so 'includes environmental considerations in the steering of societal change' (Baker, 2015, p. 9). SD is a dynamic process whose desirable characteristics change across different social, political and cultural contexts, yet it shares a common set of normative principles, such as in relation to inter and intra generational equity (Baker, 2015). SD scholarship also addresses the distinctive governance requirements that are needed to manage environmental problems across scale (globally, nationally and locally). These include the participation of a range of actors, and non-state organizations alongside state agencies, and the use of a wide range of policy instruments (Baker, 2015).

An SD framework reflects the view that nature has a social quality, such that social processes, including levels and type of consumption and production, cultural and spiritual engagement, leisure activities and managed interventions to address public policy needs, all shape the natural environment. However, the relationship is two way, in that natural processes, including ecosystem service delivery, in turn shape the opportunity that society has, to develop. Thus, for example, the reciprocity between the social world and the ecological system shapes human health and wellbeing, including through their impacts on food production. There are however, various and sometimes contradictory, approaches to how the relationship between nature and society is conceptualized. Critics note the tendency to anthropocentrism in those that highlight the utility of the ecological system for humans, and for the latter to draw from ideas about systems that are devoid of nuanced considerations of society as entailing power and agency (Schröter *et al.*, 2014).

The links between nature, society and the economy are increasingly defined using the concept of 'ecosystems services' (ESS). The concept has heightened awareness of the environmental, economic, social and cultural value of nature to humans, and has grabbed the imagination of policy makers (unlike the more abstract notion of biodiversity or nature). Understood in economic terms, ESS refers to the flow of value (costs and benefits) to human societies arising from the state and quantity of natural capital. Popularized in the UN *Millennium Ecosystem Assessment* and the *Economics of Ecosystems and Biodiversity Report* (TEEB, 2010), this understanding has led to a recognition of nature's contribution to human health and livelihoods, security and culture. Many ecosystems services are linked to health outcomes. Indirect provisioning may include green infrastructure, landscape and urban planning, urban greening and aesthetic environmental and recreational opportunities, argued to be key in the promotion of activity leading to a reduction in health inequalities (Jackson *et al.*, 2013). Direct provisioning may include availability of food and fuel sources. In addition, ESS has cultural (spiritual uses of land), supportive (natural hazard mitigation or water filtration) and regulating roles (water or land use regulation) for health.

However, the focus on EES could lead to a prioritization of policies that service human beings opening up 'nature' to marketization and to a commodity regime (via the allocation of price or value and thus the incorporation of 'nature' into the market system). Thus, at its worst, the ecosystems services perspective becomes a manifesto for the sterile translation of neoliberalism management of the environment, simply as another asset, one that can be priced and thus traded (Baker, 2015).

Concerns about the marketization and thus commodification of nature extends into contemporary debates around conservation. Commonly referred to as the 'parks versus people' debate, there are those that argue that nature should be protected given its intrinsic value, and those that argue that nature should be saved to help ourselves, and to benefit human health and wellbeing (Miller *et al.*, 2013). The former privileges biodiversity as the primary goal of conservation while the latter, drawing on an ESS framework, develops conservation goals that link poverty alleviation and health outcomes to nature protection understood in terms of protecting the flow of ecosystem services that nature can provide for people. For example, nature is managed for food security and fresh water (Tallis and Lubchenco, 2014) as the basis of health and wellbeing.

There are clear links between the maintenance of biodiversity and meeting SD goals, especially those related to health. In ESS terms calculating the economic and health benefits of activities such as planting trees, protecting bees or providing access to green space emphasize this point. While a gender dimension has been lacking, recent work has also sought to address differences in the benefits from, and the value attributed to, ESS by various social groups. Women, for example, have been shown to access green space differently, associated for example with concerns about personal safety, and for different reasons to men, including changing their use over their life course (MacBride-Stewart *et al.*, 2016). Policymakers, in addition to conservation efforts, now propose welfare-oriented development initiatives, such as eco-tourism and participatory decision-making involving women. The ESS position is reflected in several UN declarations, including those under the auspices of the Convention on Biological Diversity, Millennium Development Goals and the subsequent UN SD goals.

Against this are the arguments that EES amounts to practices such as 'green grabbing' for food security (Fairhead *et al.*, 2012) and is a reflection of the growing influence of neoliberalism within the UN global environmental governance regime (Baker, 2015). Critical of ESS, nature conservationists argue for the need to protect against development-driven extinction, advocating people-free parks for example, which are justified on the basis of current extinction rates and evidence that emphasizes planetary limits. However, those that push a social-conservationist, more welfare-focused argument do so in part for pragmatic reasons, as prior conservation efforts have not stemmed the tide of species extinction nor of health inequalities (Marvier, 2014).

Feminist environmental perspectives have also informed SD policy at the global level. The Intergovernmental Panel on Climate Change (IPCC) 2007, the UN Framework Convention on Climate Change, the Paris Agreement of 2015 and the World Health Organization (WHO) all recognize both the vulnerability of women (in the short and long-term) and the need to promote gender equality, empowerment of women and intergenerational equity. In seeking redress, the WHO locates gender within its broader discourse of the Social Determinants of Health — 'this includes addressing the underlying causes of vulnerability, such as poverty, lack of empowerment, and weaknesses in health care, education, social safety nets and gender equity' (WHO, 2014, p. 4; see also Costello *et al.*, 2009; Terry, 2009). Women are also promoted as agents of change at the community level for social and environmental resilience. The UN Environment Programme, for instance, cites examples ranging from women successfully driving energy efficiency in India to anti-poaching teams in Africa.

In the context of development in the South, recognition of nature-society relationships have spearheaded significant shifts in thinking around development since the 1980s as models of economic modernization that required the 'Third World' to catch up with the 'First World' were substituted by SD frameworks. Brundtland's *Our Common Future* (WCED, 1987) was the first document that clearly argued that there were limits to economic growth given the biosphere's limits to absorb the effects of human activities, even with technological and social innovation. Thus, conventional development required rethinking in ways that could encourage 'environmental leapfrogging', preventing

latecomer countries from going through the same pollution intensive stages of industrial development as industrialized countries have experienced in the past (Baker, 2015). SD, therefore, requires new indicators of progress, including the shift to zero growth strategies backed by a science that is embedded in sustainability and governance modes that factor in ambiguity and uncertainty rather than linearity and presumptions of certainty.

The challenge of these dualistic paradigms around biodiversity has direct ramifications for women especially in the South. The role of gender in the early years of these debates presented women as passive victims of the environmental degradation stemming from global processes. As the discourse shifted from discussion of the environment to that of sustainable development, a new focus emerged. This emphasized women's positive roles as efficient environmental resource managers within the development process. In this view, women become the saviour of humankind, helping society to promote sustainable futures. The arguments in support of a gender perspective on SD, especially those that stress the role of women in local promotion efforts, are built upon a claim that women had 'privileged knowledge and experience of working closely with the environment' (Braidotti *et al.*, 1994, p. 2). Thus, within the sustainable development narrative, especially of the UN, there are arguments that gender was crucial to the debate between social protectionists and social conservationists. In the debate, women were argued to be key agents in the promotion of sustainable patterns of natural resource management and holders of knowledge about their local environment (indigenous ecology). The gender perspective is also built upon the promotion of a rights-based agenda for women, and on the principles of equity and partnership, including in relation to land tenure.

However, poverty alleviation and conservation strategies aimed at maintaining biodiversity (and ultimately also ecosystem services) are not related in a simple, cause-and-effect manner. While synergies do exist between biodiversity and alleviating poverty, often times these prove elusive in practice and difficult trade-offs have to be made (Billé *et al.*, 2012). The links between social, economic and environmental dimensions of sustainable development are thus complex. From a 'parks' perspective the problem is that, as agents in the promotion of SD, women, ironically, become complicit in the creation of a future that can potentially destroy biodiversity. This is especially the case if poverty alleviation strategies are designed in ways that promote weaker versions of SD, those more akin to mainstream economic development models.

In this historic context, women, having first been construed as victims of environmental degradation, then as its potential saviour, risk a future where they become demonized as agents of biodiversity decline, especially by those stressing the need for nature protection. The same arguments are true when health is the focus of the development strategies. Women were initially recorded as victims of patriarchal health systems, until their role as informal and formal carers was recognized. As the demand for environmental health promotion has increased, policies that promote the use of the environment for health benefits increasingly puts users at odds with conservation approaches.

As global geopolitics shift perceptibly, the two paradigms – of people versus nature – are in continual tension. So, while the emphasis on SD predominately is located in the North there is a surge among countries in the south like China, South Korea and the Gulf countries to buy up land as part of green security (Borras *et al.*, 2012). Erstwhile political economy theorizations based on dualist perspectives of the First-Third World (such as core-periphery) are inadequate as critiques of current global politics. As SD as a concept itself sits on contested ground, the construction of women's roles in environmental management and governance literature in turn appears fraught. It is imperative to rethink gendered constructions that go beyond nature/culture binaries to address the complexities in this current period of sustainability politics and environmental management.

Gender, environment and health: towards interconnectedness

Our approach to examining the implications of the North-South binary for gender, health and the environment has been to critically review three key bodies of scholarship that inform the contemporary debates on gender, environment and health. Arguably, each of these epistemic bodies have made significant strides in decentring masculinist foundations and re-centring women/gender.

In this reversal, the remedial corrective has effectually substituted one set of conceptual frameworks (a masculinist one) for another (feminist), substituting a new vocabulary of dualist thinking. While it is critical to re-centre women's perspectives, any reorientation needs to be critically aware of the relationship between nature/culture and the North-South in the current context of changing geopolitical landscapes. As the World Development Report (2013) notes:

> as countries are increasingly interconnected through trade, migration, and information and communications technologies, it is no surprise that policy decisions in one place have substantial impacts elsewhere. The crises of recent years – food, financial, climate – which have blighted the lives of so many point to this, and to the importance of working to reduce people's vulnerability to shocks and disasters (Foreword: iv).

In this section, we extend our argument to demonstrate the limitations of dualist thinking on understandings of health and environment. In its place, we advance interconnectedness as a conceptual consideration beyond dualisms.

Each of the literatures we cite frame the relationship between gender and environment differently. Within the gender, environment and development discourse, where women are regarded as natural custodians of the environment, a positive relationship between nature and health is assumed. In other words, deterioration of nature equates to a deterioration in women's health, just as improvements in one directly positively impacts upon the other. Poor health is anticipated to be a consequence of a disconnection between nature and women's lived realities, especially within the context of the South. The ecofeminist account, and its variants, that link biology or social roles to nature, cannot, however, account for the varied experiences of wellbeing and ill-health across the North and the South. Here the linkages between women (and community), health and natural environments is far more complex and is mediated through various structural/systemic and ideological factors and practices.

The SD literature emphasizes the social processes that produce and sustain health inequalities by gender and geographical region. Central to this account are the economic aspects of environmental change that many scholars argue are the most enduring and significant health determinants, and the centrality or significance of ecological systems that aligns human health to wider ecological systems. In this context, health is a politically inflected process that reflects the interplay between human and natural systems. Changing parts of the system, be it social, economic or ecology, impacts upon health. In contrast to development models, the SD literature considers the possible consequences to nature of various models that progress health and economic development along traditional neoliberal lines. Health is achieved by the marrying of ecological, economic and social objectives within development projects. This means that human health (unlike in GED or STS literatures) has to be managed to avoid a trade-off between economic progress and ecological integrity. Health is important, and in SD is central to the decisions that are made about current and future societal goals. At the extreme end of the debate, nature is managed entirely for the achievement of human health and wellbeing. As such, health and the reduction of inequalities must be understood as a trade-off between different aspects of human life and its management. Women are implicated in these trade-offs, being variously positioned as responsible for the management of their families' health and achieving this through the social and normative expectation that they have a role in preserving and protecting human life. The role of women as consumers means that they also risk using technologies that have the potential to harm the environment and/or that strategies that alleviate poverty may in fact be unsustainably demanding on the natural world.

At the same time, health is becoming complicated not only by the geopolitical shifts affecting gender and environment relations as identified in each of the literatures, but also by the reorganization of medicine, its practices, knowledges and systems, particularly in the North but now also in the South. Not only has the global profile of diseases changed but also biomedicine itself, been altered by the same processes of globalization (e.g. trade, privatization of health, technology and policy). Clarke *et al.* (2013) argue that, institutionally, medicine, in the period since the 1980s, has been transformed by a set of interrelated processes of modernization, scientization, technical innovation and neoliberal economics. These have shaped its organization and structures, its knowledges and

activities, and contributed to a proliferation of different types of health professionals, 'patients' and 'risks', alongside the commodification of its practices. These changes are occurring across all levels of governance, from the local to the global, from populations to individuals (Rose, 2007). There is also the global regulation of health by supranational bodies such as the WHO and the UN, whose activities during this period reflect a shift away from the primary management of infectious disease and population control towards a broadening out of the social, economic and ecological dimensions of disease and increases in chronic and non-communicable diseases. At another level of health regulation, there has been an augmentation of individual self-management of health and illness occurring alongside population-based controls, mainly managed by the state. Here, the multiple linkages between ecological and health systems and individual practices are emphasized, so that attempts to reduce waterborne illness, for example, need to draw on ecosystems approaches to address vector habitats, biodiversity and natural controls, as well as local, public service and public health responses (Brown, 2014). Furthermore, STS scholars remind us, knowledge about health impacts are increasingly driven by economic agendas for science, shaping health knowledge and options for practices. When considering economics agendas we may want to ask the question: what is being researched, by whom and for what purposes?

The health impacts of environmental change may therefore be regarded as variable across the North and the South and the diversity of scientific perspectives has contributed to its capriciousness. Some scholars remain positive about the possibility of technological, scientific and even economic 'fixes' that seek to overcome the illness generated by environmental changes, ranging from vaccines to life-style measures, pharmaceutical treatments to financial remediation. Yet, science is unlikely to grasp the full impact on human health of environmental change from toxins to loss of biodiversity (and its effects on food sources) because of the limitations of science described earlier. Despite the possibility that biomedicine respects the social conditions in which illness is manifest in response to environmental change, the assumptions about causes and or effects remains tied to nature-culture, North-South binaries.

The three bodies of scholarship we reviewed provides different, if competing, frameworks to understand women, environment and health. Whereas the GED literature posits a direct, positive relationship between them (better environment equates to better health for women), the SD scholarship emphasizes the trade-offs in which women are likely to play a contentious role as agents in their pursuit of health, wellbeing or community development. The STS literature, on the other hand, speaks to absence and powerlessness of women, in spheres where health knowledges are dominated by resources and technologies located in the North. Yet, as we have critiqued thus far, the implied dualisms in these literatures fall short of the analytical lenses needed to explore women's health outcomes at a time when human activities on a global scale have impacted on the environment leading to the accelerations in the rate of movement of diseases, and shared, global exposures and risks.

Reframing the gender experience from the perspective of complex linkages that impact on health necessitates a transition from dualistic thinking to frames that recognize the complexity and indeed, the interconnectedness – that is, the continuities and commonalities – of lived realities between the North and the South. Intersectionality approaches, favoured in current academic scholarship in a bid to resolve the constraints of dualism, focus on the specificities and differences that define women's lives in localized settings. Interconnectedness, on the other hand, seeks to recognize that health and gender intersections are not solely contained within the immediate social environment but rather are influenced by conditions, both material and ideological, that are global in breadth and that influence the ways in which women, communities and populations (and their health) are linked to natural environments. In other words, without falling into the trap of homogenization, an interconnectedness perspective seeks to understand better the convergences in institutional and individual behaviours and practices in a range of domains. The impact on environments through similarities of women's roles, such as consumers, conduits, distributors and producers of knowledges and products, deserve attention in ways that go beyond the dualistic frameworks solely focused on women's roles as custodians and conservationists.

In our new approach, women's agency is simultaneously re-centred and problematized. The notion of women as agents in neoliberal conceptualizations that emphasize individual ability to change the circumstances of their health outcomes is clearly flawed. Instead, women, in both the South and the North, need to be repositioned as actors in a wider gamut of relationships and processes within which their individual actions are nested. Women as agents must be seen as actors within ecosystems. As much as she is a carer, a woman also travels, consumes, produces, reproduces, feeds, wastes, pollutes and pursues healthy living habits in ways that connect her to society and environment, and while she does so in the context of her immediate social norms and spatial constraints, the implications are global and planetary. Poverty here is significant. While existing dualistic frameworks point to the vulnerability associated with poverty, as actors in interconnected systems, poor women — both in the North and the South — are participants in, not merely affected by, the activities that perpetuate ecological degeneration.

At another level, however, an interconnectedness approach also redirects analytical attention on to society and ecology as 'coupled systems'. Ecological and social systems operate through reciprocal relationships, impacting on each other through non-linear, feedback loops. This means that the relationships in these systems are not just complex but rather have the ability to significantly shape the opportunities for and barriers to positive outcomes in both the ecological and social spheres. In contrast, dualistic frameworks – including those pursued in the determination of health outcomes – rely on linear, cause-effect scenarios that posit liabilities and advantages in ways that are aligned with North-South power relations. However, the complexity of the casual relationships between health, the environment and gender, suggests an intricate series of relationships that are marked by an uncertainty dynamics and non-linear feedbacks (Braveman and Gottlieb, 2014). In addition, the current geopolitical order clearly puts new forms of pressure on coupled systems that are far more complex than has been earlier understood, and its impact wider reaching than previously acknowledged. The implications for health outcomes are that they are not confined within spatially defined boundaries. Thus, while one may expect that life chances be improved among the affluent, the reciprocal nature of the relationships and processes that tie environments and societies suggests that such direct correlations of outcomes are not guaranteed.

The complexity and multiplicity of causal relationships between nature and society has been raised in the emerging works of new material feminists. In seeking to re-embed the biological and material into socio-political and linguistic worlds, they emphasize that human-environment relationships should be seen, not as linear or causal, but as temporally interdependent and multi-directional assemblages and connections, parts of open systems that spontaneously develop collective properties or patterns (Frost, 2011, p. 78). As is our own argument in this paper, they too propose that the current vocabulary in feminism is insufficient to capture the 'dynamic interactive processes that constitute organisms, objects, and environments' (Frost, 2011, p. 78). Where our analysis digresses is in the integration of a regional lens, i.e., North-South, into these debates, significantly widening the scale of analysis to interrogate nature-society linkages.

In sum, the 20th century frameworks that we continue to use to understand 21st century geopolitical contexts need urgent revision. A lens of interconnectedness reframes the questions posed and would emphasize the role that commonalities play in understanding the health impacts on women in the North and the South – the similarities of certain roles, the identities shaped through technology and economic globalization, their relations to structures of production and patterns of consumption, the shared implications of global policy agreements. What are the characteristics, and impacts, of women's consumption in the North-South? How have technology adaptations (including biomedical technologies) influenced sustainability and health outcomes? How do they inform understandings of women's health? How do transnational frameworks and programmes of sustainable development impact on women's relationships with their natural environment?

These questions, by no means comprehensive, are indicative of the possibilities of new thinking around how women globally interrelate with natural environments through an evaluation of the common ground among them. In so doing, it reconceptualizes a new ethic of health that links into wider systems and sets of relations beyond nature/culture/society dichotomies.

Conclusion

Our paper is a critique of current North-South theorizations that are framed around simplistic understandings of the relationships that exist between these geopolitical regions. The existing SD debates, we argued, fail to acknowledge the heterogeneity of gendered actors and their relationships to natural environments, and of the multiplicity of knowledge frames that inform science and policy to redress environmental concerns. The paper traced dualistic thinking in three key bodies of scholarship, pointing especially to the dichotomous framing of women: North-South, victim-polluter, rich-poor and so on. These dualisms, we contend, make limited allowance for the fluidity of roles and relationships by diverse women in both the North and the South in contributing to environmental degradation, on the one hand, and in promoting sustainable development, on the other, and the complex ways in which contemporary social worlds and natural environments interact. It also makes little allowance for the heterogeneous and contradictory manifestations of neoliberalism in shaping consumptive behaviours at the level of the individual, and in shaping decision-making at the broader level of governance. Instead, the limited constructions of Third and First World women, their life-styles and practices, from sustainability, medicalization and technology discourses, and contemporary social determinants of health policy discourses fail to capture the more dynamic interlinkages between these regions, particularly in relation to environment and health. Equally, these discourses can also perpetuate contradictory understandings of gender and environment – as for example, when as agents in the promotion of sustainable development, women become complicit in the creation of a future that can potentially destroy biodiversity. In consequence, what is needed is an interconnected understanding of the ways in which women's health is particularly vulnerable to environmental transitions occurring as a result of social, economic and political transformations operating globally but experienced locally. We conclude the paper alluding to the possibilities of an interconnectedness perspective that focuses on the commonalities and shared lived realities of women and their environments.

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1. WDE refers to one of the earliest strands within gender, environment and development (GED) literature that emerged in the 1980s and is associated with ecofeminist scholarship.

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