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Examining the place of ecological integrity in environmental justice: A systematic review

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Environmental justice research is predominately an anthropocentric endeavour, and it is unclear whether this research captures injustices to other species or the integrity of ecological systems that support all life on earth. The purpose of this article is threefold. First, we systematically review the environmental justice literature to identify the epistemological perspectives from which environmental justice is conveyed. Second, we examine definitions of environmental justice to determine how the concept is operationalised across these paradigms. Third, we document under what conditions these definitions purposely acknowledge the interdependency of all species in order to elucidate the place (or absence) of ecological integrity in our understanding of environmental justice. We conclude with a discussion of the value of going beyond mainstream expressions of environmental justice that typically do not include ecological integrity as a way to begin addressing the problem in a more holistic way.

Keywords: environmental justice; ecological integrity; systematic review; anthropocentrism; Indigenous perspectives

Introduction

The concept of environmental justice evolved from the Civil Rights Movement of the 1950s, and captures the notion that exposures to environmental threats can be asymmetric; for example, children, women of colour, people living in poverty, Indigenous peoples, and other vulnerable groups may be disproportionately affected by harmful environmental hazards (Cutter 1995, Cole and Foster 2001, Bullard 2005). Evolving with an anthropocentric focus, the United States Environmental Protection Agency (EPA) (2012) created the following definition in 1994 to operationalise the concept:

> Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work (para. 1).

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There is also evidence indicating that these same environmental hazards threaten non-human species, disrupting the interdependence required for both humans and non-human species to develop sustainably and in good health. Globally, many ecosystems and climate systems are dangerously close to or have surpassed important tipping points (United Nations Environment Program 2011). Tipping points represent the thresholds of systems at which point small disturbances can cause (sometimes irreversible) changes to the fundamental ecological services which support all life on earth (Lenton *et al*. 2008). Thus, it is important to expand our frameworks for understanding injustice to include more than human species, and environmental justice has the capacity to capture such injustices and reduce inequalities.

Research on the subject of environmental justice has steadily increased since the publication of the EPA definition (Holifield *et al*. 2010), resulting in a diverse collection of conceptual and operational definitions (Schlosberg 2004). The definitional plurality inherent to the environmental justice discourse is further complicated by its multiplicity of purpose. For example, environmental justice may be regarded simultaneously as being a "grassroots movement, a research paradigm, a policy framework, and a political ideology" (Masuda 2008, p. 3). The purpose of this systematic review, therefore, is to first identify *who* is defining environmental justice (across a wide range of paradigms, for example, political, legal, feminist, and others) and second, to clarify *how* scholars define environmental justice. While the concept of environmental justice has typically underplayed (at best) or entirely neglected ecological integrity, there is an opportunity to reconcile the two, to provide a framework that advances freedom from pollution and environmental degradation, while protecting the environment and supporting health and well-being for all. Therefore, the third purpose of this systematic review is to investigate whether definitions are explicit about or underplay the interdependency of human beings and other species within the natural systems that support us. Doing so will elucidate the place (or absence) of ecological integrity in our current understanding and use of environmental justice to frame social, environmental, and health equity for all.

Background

Research on environmental justice focuses on identifying patterns of environmental inequity and describing the historical processes underlying these patterns (Brulle and Pellow 2006). Essentially, distributive justice (who receives the benefits and who bears the costs?) and procedural justice (how are decisions made?) are the main components of the environmental justice framework (Vaughan 1995). One of the first published examples of environmental injustice appeared in the early 1980s wherein a study revealed that three out of four proposed landfills in a North Carolina County (United States) were located in low-income African-American communities (Geiser and Waneck 1983, as cited in Cutter 1995). Since then, environmental justice studies have examined the phenomena of exclusion from decision-making processes, disproportionate demographic representation in high-risk occupations, as well as the impact of multivariate pollutant burdens on certain populations (see, for example, Brulle and Pellow 2006, Agyeman *et al*. 2009). These populations include groups of people who are more likely to be affected by poor environmental decision-making because of their race, class, gender, age, or culture (Masuda *et al*. 2008). Environmental justice inquiry continues to evolve as the scope of research has expanded to include global-scale health inequalities and differential effects associated with environmental change, including the disposal of toxic and electronic waste, climate change, and

the influence of international trade policies (see, for example, Pellow 2007, Vanderheiden 2008, Westra 2009).

While environmental justice inquiry has proven useful in identifying the inequitable effects arising from environmental exposures, the focus of these effects has largely been limited to human beings (DeLuca 2007). The anthropocentric focus of environmental justice is also supported by a language of human ethics. This common language supports human rights and equality while attempting to dismantle racism and gender-based inequality (Pezzullo and Sandler 2007). Environmentally destructive policies and practices also intensify the scarcity and the maldistribution of natural resources, thus threatening basic livelihoods worldwide (McGranahan *et al*. 1999). However, the same destruction causes irreparable harm on the systems required to support human development and also affects the health and sustainability of other species (Millennium Ecosystem Assessment 2005). For example, it is estimated that the populations of several terrestrial, aquatic, and marine species have declined by more than 30% since records were first kept in the early 1970s (World Wildlife Fund 2010).

Regardless of whether or not environmental degradation results in a human injustice, the function of ecosystems will not support life if degraded to the point at which integrity is compromised (Pimentel *et al*. 2000, The Earth Charter Initiative 2010). Ecological integrity is a concept that acknowledges the inherent potential, stability, capacity for self-repair, and independent management of an ecosystem (Karr 1992). It is these features that enable ecosystems to provide, regulate, and support all life (Millennium Ecosystem Assessment 2005). Arguably, a weakness of the environmental justice discourse rests in its inability to highlight the related inequities of both social and ecological maladies. Some disciplines *have* merged the goals of social and ecological justice. Environmental education (Bowers 2001, McLaren and Houston 2004, Mueller 2009) and eco-theology (Kearns 1996, Gibson 2004), for example, are two fields of study that have married social and ecological justice through the concepts of eco-justice and ecospirit. Furthermore, many Indigenous groups hold the worldview that humans are inseparable from other living things and the elements that make up the environment, an interconnected community sometimes referred to as "all our relations" (see, for example, LaDuke 1999, McGregor 2009). In limiting the scope of the systematic review to environmental justice discourse, it becomes possible to evaluate whether our understandings of this particular line of inquiry are inclusive of ecological integrity. First, however, we need a baseline understanding of how the concept is operationalised across a wide variety of paradigms. Then, we can document under what conditions these definitions purposely acknowledge the interdependency of all species in order to elucidate the place of ecological integrity in our understanding of environmental justice. This systematic review contributes to unpacking the nuances of environmental justice literature.

Method

We undertook a systematic review of the literature to identify common perspectives and elements in scholarly definitions of environmental justice, and to ascertain whether principles associated with ecological integrity, or similar frameworks, were clearly evident. The purpose of a systematic review is to identify, appraise, and summarise literature of relevance to a specific topic (Nicholson 2007). Commonly used as a keystone for evidence-based policy and practice, particularly in the healthcare profession, systematic reviews are often best suited for synthesising large volumes of literature because they are condensed, verifiable, replicable, and readable as final products (International Development Research Centre 2008). In synthesising large amounts of research literature, systematic

reviews often fulfil the "promise of arriving at working research conclusions and workable practice solutions" (Sandelowski 2008, p. 104). While we acknowledge the value of integrated frameworks and worldviews such as those mentioned above, the focus of our study remains limited to *environmental justice* discourse specifically. We have made this decision based on the widespread use of the term (evidenced through the number of articles published on the topic, described in detail below), and as a means to puts limits on the scope of the systematic review.

The Cochrane Collaboration guidelines for systematic reviews suggest that they are iterative processes, which require the modification of inclusion criteria based on retrieval results (Lefebvre *et al*. 2009). As there are thousands of articles written on environmental justice, inclusion criteria for this review were refined four times during the retrieval process (Figure 1). Reviews restricted to one database are often insufficient (International Development Research Centre 2008) and thus, four multidisciplinary databases, EBSCOhost, JSTOR, PubMed – MEDLINE, and ISI Web of Science, were searched. The four databases were selected for their combined broad coverage of disciplines spanning across the natural, social, life sciences, and humanities, thereby providing the possibility of retrieving a varied representation of environmental justice perspectives. These academic databases, which consist of content that are carefully evaluated and selected, offer a more rigorous tool than commercial search engines such as Google Scholar©. Commercial search engines rely on robotic "crawling" techniques to identify scholarly documents. Documents that are inaccessible through these techniques or lack a "scholarly" appearance are excluded

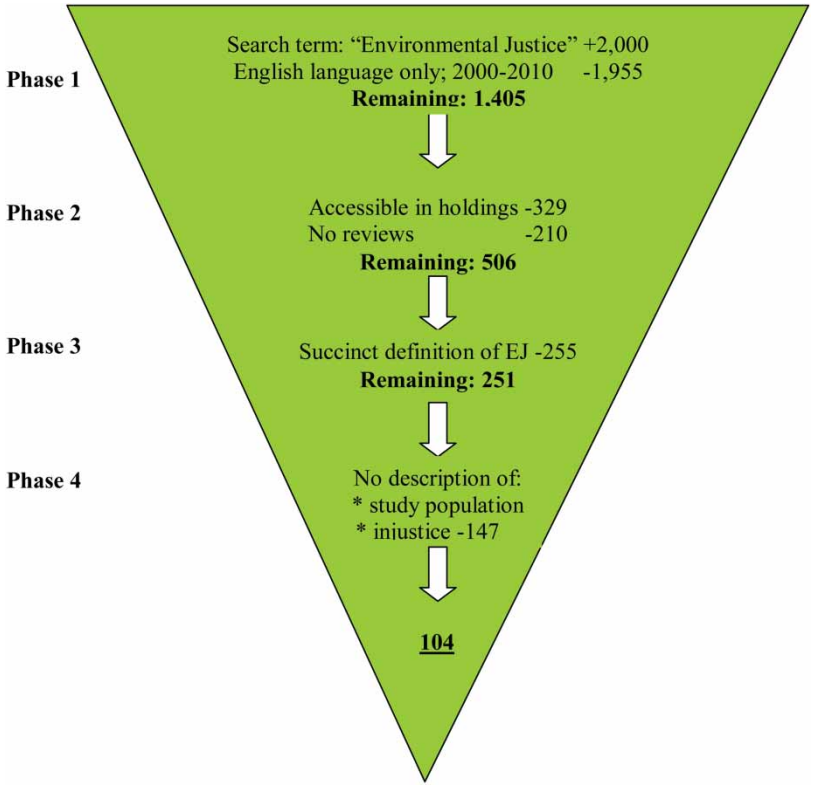

Figure 1. Inclusion criteria process.

from search results. For this reason, and because they do not always provide complete documents and can take anywhere from 3 months to 2 years to recognise updated document information (Google 2011), commercial search engines were excluded from this review.

A preliminary scoping of the literature in the four databases using the subject term "environmental justice" retrieved result numbers too large to be reviewed within the timeframe of this study (upwards of 2000 hits). Furthermore, the conception of "subject term" itself was inconsistent among the four databases, making a title search the most homogeneous method of retrieval. As such, databases were searched for articles with "environmental justice" in the title. The first round of inclusion criteria was further restricted to articles published in English between the years 2000 and 2010. With the recent proliferation of environmental justice literature, we concluded that articles published in this date range would provide a good representation of evolving, progressive and diverse perspectives. Sources were not limited to any particular geographical region. This search resulted in 1045 articles and a title scan verified that no other systematic review on this topic had been undertaken to date.

In the next phase of the systematic review, the scope was further narrowed through a second iteration of inclusion criteria. For inclusion in the review, articles had to be accessible through the library catalogue at the time of the review and could not be an article or book review. Dalhousie University has the largest library collection in this region of Canada, it is this region's leading research university, and the university subscribes to over 40,000 journals (Canadian Association of University Teachers 2011), making it a satisfactory repository of literature for this review. Of the article titles, 329 were inaccessible through the university online retrieval system and 210 were classified as book or article review of others' work. The third round of inclusion criteria required articles to have a succinct definition of environmental justice. Of the remaining 512 articles, 255 did not have succinct definitions. The 257 articles with explicit definitions for environmental justice provided in the text were then further subjected to a fourth – final – iteration of inclusion criteria. Articles were included if authors' definitions articulated two key components: their interpretation of a population under threat and how they understood the nature of the injustice. The purpose of these inclusion criteria was to allow for analysis of the presence or absence of non-human species within accounts of vulnerable populations and injustices. In short, if the authors did not refer to any particular population (human or non-human) or if they did not specifically identify an environmental justice scenario as part of their research, these articles were removed from the review, as they did not allow for engagement in analysis. The final inclusion criteria yielded 104 articles for the systematic review.[1,2] Each article selected for a full review underwent standardised evaluation by using an extraction sheet, which included the following five components: citation, environmental justice definition, threatened population, type of injustice, and study design. It was during this process that we found several research paradigms emerging and, thus, began our coding structure to determine *who* is defining environmental justice and *how* the concept is operationalised across these paradigms.

Findings 1: Who is using environmental justice?

A detailed reading of the manuscripts and their definitions of environmental justice revealed that environmental justice literature is conveyed across a spectrum of epistemological perspectives. To help elucidate the first objective of the system review – *who* is using environmental justice – each article was appraised and grouped into one of seven epistemological categories. Although it may have been possible to group some of the articles into multiple categories, for analysis and presentation purposes, we focused on what we interpreted to be the

major theme of each article. Articles were allocated to a category based on title and article keywords, journal of publication, and definition of vulnerable population and injustice. The following seven epistemological perspectives emerged from the literature: community-based, legislative, epidemiological, Indigenous, procedural, feminist, and environmental health.

Community-based

A total of 44 community-based research articles described participatory interventions and research that bridges the gap between science and practice by actively engaging populations to improve public health, and more specifically, the health disparities which exist for racial and ethnic minorities (Israel *et al*. 2005, Wallerstein and Duran 2010). Articles grouped in the community-based category were characterised by keywords and themes relating to alternative and community-based participatory research methods and international and local grassroots movements.

Legislative

The USA is the only country with explicit environmental justice legislature to date, and therefore, articles in the legislative category referenced one of three variations of the EPA definitions of environmental justice. Of the 21 articles in this category, 15 authors referenced the EPA main definition (see *Introduction* of this paper), five authors referenced the Executive Order definition,[3] and one referenced the Department of Transportation definition.[4] These articles were characterised by keywords and themes relating to distributional justice, procedural justice, and enforcement.

Epidemiological

Epidemiology is broadly the study of human health and disease of populations in relation to their environment and ways of living, while environmental epidemiology is more specifically concerned with environmental factors in disease (Thomas 2009). The 20 articles grouped into the epidemiological category were characterised by keywords and themes relating to risk and human disease frequency, empiricism, biomarkers, methods used, and study design (i.e. GIS, mapping, statistical analysis, spatial models, tables, and figures).

Indigenous

A total of eight articles grouped in the Indigenous category were those that examined environmental justice issues in relation to Indigenous peoples. Indigenous scholars and those engaged in research involving Indigenous peoples acknowledge the spiritual, physical, emotional, and psychological components of health and strive to decolonise the research process (Smith 1999, Wilson 2003). This includes using techniques and methods that align with Indigenous traditions and knowledge in order to respect and reclaim Indigenous culture (Denzin *et al*. 2008). These articles were characterised by keywords and themes relating to Indigenous or Aboriginal Tribes or Nations, autonomy, Indigenous knowledge and worldviews, and resource management.

Procedural

Articles in the procedural category include those that examined environmental justice from a legal standpoint, and were often reports involving court cases of environmental injustice.

Although relatively few in number, the six articles allocated to this category were characterised by keywords and themes relating to policy, policy review, legal cases, and environmental regulations.

Feminist

Feminist scholarship analyses and challenges dominant epistemological and institutional paradigms often from the standpoint of the disadvantaged to promote equity (Sprauge 2005); three of the articles in this review were allocated to this category. Feminist scholars address constructions of gender, and in the context of social/environmental justice, recognise that race, class, and culture situate women differently within complex systems of power (Denzin *et al*. 2008). Articles grouped in this category referenced keywords and themes relating to gender, women, reproductive rights, sexism, and economic exclusion.

Environmental health

The two articles grouped in the environmental health category were those that addressed and linked functions of the biophysical environment to human health. Environmental health is a convergence of the related concepts of ecology and health and human ecology (Parkes *et al*. 2003), and is defined as the prevention of disease and creation of health-supportive environments through the assessment and control of factors (physical, chemical, and biological) that can potentially affect health (World Heath Organization 2011). These articles focused on themes relating to ecosystem services, holistic approaches, sustainability, and non-human species.

Findings 2: How is environmental justice operationalised?

After identifying *who*, within the parameters of the systematic review, is defining environmental justice, we wanted to examine *how* definitions of environmental justice are operationalised across the seven epistemological perspectives. To achieve this second objective, we carefully read each definition in the summary tables to draw out any emergent themes. Analogous keywords, meaning those similar keywords associated with a particular field of interest, were highlighted with a corresponding colour. After coding each definition, the keywords were complied and associated with an emergent theme (Table 1: emergent themes and their associated keywords). The following 11 emergent themes were observed (listed in descending order of frequency): vulnerable population, biophysical landscape, distributive justice, human health, law, procedural justice, environmental health, restorative justice, economy, autonomy, and gender.

Of the emergent themes, vulnerable populations, the biophysical landscape, human health, and distributive justice were most frequently referenced (Figure 2). To help better understand the place of ecological integrity within the literature, we wanted to explore each reference to a vulnerable population to determine if any non-human species or natural systems were considered vulnerable. A review of the definitions indicated that low-income populations were most commonly cited as being vulnerable populations ($n = 47, 45\%$)[5] and minority populations (including African-American, Hispanic, and Indigenous populations) were cited almost as often ($n = 38, 37\%$). The remainder of vulnerable populations included those characterised as being low-education, non-English speaking, urban, disabled, elderly, uninsured, underserved, children, farm/forestry workers, immigrants, people living in the global South, in poor housing or near an identified risk, in

Table 1. Emergent themes and their associated keywords.

Emergent theme	Keywords
Vulnerable population	Age, income, race, minority, tribe, community, population, individual, and people
Biophysical landscape	Natural resources and climate change. Use of 'environment(al)' as a descriptor
Distributive justice	Allocation, fair treatment, disproportionate, equity, utilitarianism, distribution, siting, targeting, and selective
Human health	Well-being, exposure, life, risks, pollution, harms, burdens, contamination, impacts, toxicants, susceptibility, and welfare
Law	Regulations, policy, politics, enforcement, protection, and government
Procedural justice	Participation, involvement, duty, democratic, practice, and expression
Environmental health	Future, ecosystem services, holistic, sustainability, ecology, clean, protection, degradation, precautionary, depletion, and intergenerational
Restorative justice	Compensation, removal, righting, correcting, ameliorate, response, reduce, remedy, and mitigate
Economy	Corporate relations, economics, and capitalism
Autonomy	Self-determination, heritage, identity, sovereignty, survival, and preservation
Gender	Woman and gender equity

sparsely populated and rural areas or not owning a vehicle, materially deprived, politically marginalised, and working-class. In short, none of the articles indicated or gave an example of a non-human species as being vulnerable.

While the biophysical landscape was ranked as an equally emergent theme to vulnerable populations in environmental justice definitions, it was rarely referred to as having the capacity to influence human health and the health of other species. The biophysical environment was used almost exclusively as a descriptor of the source of effect (i.e. *environmental* policy, *environmental* risk). Distributive justice appears as an emergent theme in the

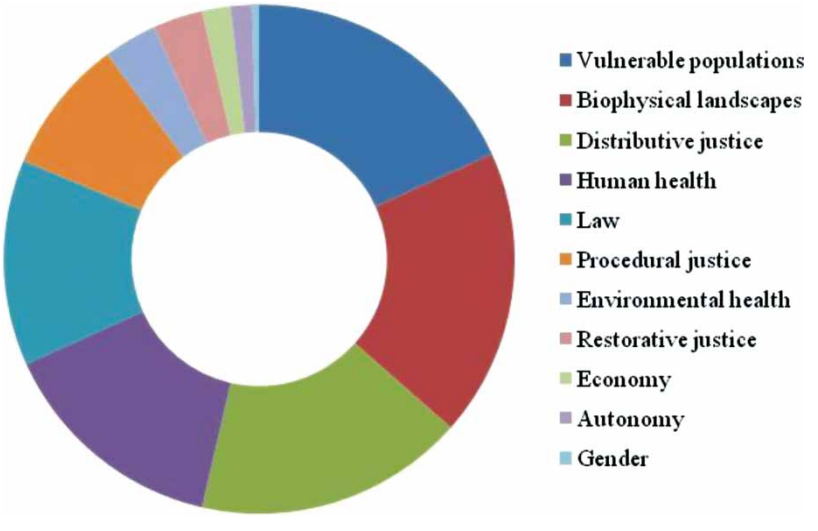

Figure 2. Frequency of emergent themes.

definitions second to vulnerable populations and the biophysical landscape. This finding is striking as many environmental justice advocates now recognise that a focus on distributional justice is not sufficient for ameliorating environmental injustices; doing so may neglect the underlying, often systemic institutional causes of such distribution (see, for example, Fraser 1997, Shrader-Frechette 2002, Schlosberg 2004).

Findings 3: Does ecological integrity factor into environmental justice?

Through this systematic review, it was possible to extract exactly *how* scholars define environmental justice by identifying common language and frequently used terms. From this coding structure and analysis, we were able to more closely examine the data to address the third objective of the review: to investigate whether definitions of environmental justice are explicit about the role of ecological integrity in our understanding of environmental justice. Below, we have isolated and elaborated upon the most relevant observations gleaned from the data as they relate to the third objective of the systematic review.

Epistemological perspectives

After parsing each article into an epistemological category, the results indicated that community-based articles have the most definitions in the summary table ($n = 44$), followed by legislative ($n = 21$) and epidemiological articles ($n = 20$) (Figure 3). Of the community-based articles, the most emergent themes were vulnerable population ($n = 32$, 73%) and human health ($n = 32$, 73%), whereas of the legislative articles, the most emergent themes were distributive justice ($n = 3$, 100%), vulnerable population ($n = 3$, 100%), biophysical landscape ($n = 3$, 100%), and law ($n = 3$, 100%).[6] Of the epidemiological articles, the theme that emerged with the most frequency was human health ($n = 18$, 90%).

The environmental justice movement emerged as a grassroots movement (Cole and Foster 2001), and today many community-based participatory researchers help to facilitate dialogue and action between the community and the academy. On account of the direct engagement with marginalised populations to improve quality of life, it comes as no surprise that community-based participatory researchers are the primary contributors to

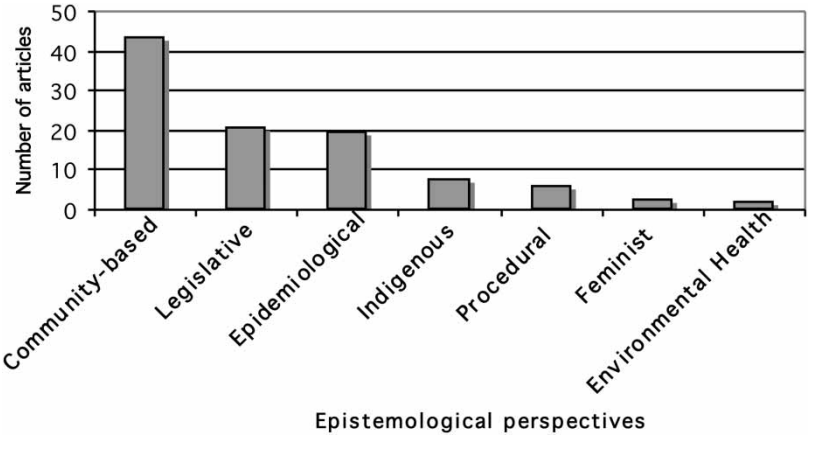

Figure 3. Number of articles for each of the seven epistemological categories.

environmental justice scholarship. However, despite an abundance of community-based environmental justice scholarship, a deficit in environmental justice legislation suggests poor communication and policy uptake among all agents. Nearly 60 years after the advent of the watershed Civil Rights Movement, considered to be a foundation of the environmental justice movement (Cole and Foster 2001), environmental justice continues to fly under the radar of many federal, state/provincial, and municipal political agendas. There is an increasing trend and desire for evidence-based policy-making (Sanderson 2002), and it is community-based scholars who have the evidence to impart for legislation. Understood within the context of legislative reality, the results of the review suggest that communication between the academy and political arena needs to be strengthened, both in project collaboration and dissemination of environmental justice study results.

Gender as an underrepresented theme

While the concept of ecological integrity was scant in the environmental justice literature, gender was the second most underrepresented emergent theme in the definitions. If one considers the disproportionate number of women living in poverty and the gendered nature of our institutions (Buckingham *et al*. 2005), along with the observation that in many circumstances, women have been the leaders in the fight for environmental justice (Rainey and Johnson 2009), the question of representation is relevant: whose voices are being heard in environmental justice inquiry, and more importantly, whose are silent? This finding suggests that further research could be carried out to explore the perspectives of individuals or communities who have been overshadowed or neglected within environmental justice action and discourse.

Primary definition

Of the 104 tabulated definitions, the EPA main definition (see *Introduction* of this paper) of environmental justice was cited most frequently ($n = 15$, 14%). This is likely for two reasons. First, explicit environmental justice legislation is rare, making the EPA definition an easily accessible, commonly known, default definition. Second, the EPA definition is succinct, making it appealing to refer to in light of definitional pluralism. However, close scrutiny of the definition reveals it lacks the following emergent themes: gender, autonomy, restorative justice, and environmental health. This finding calls into question the efficacy of the EPA policy framework in terms of its capacity to attend to a wide spectrum of community interests including ecological integrity, and suggests that it may indeed be time to revisit and re-conceptualise the definition.

Study designs

Of the articles reviewed for this study, 54% were conceptual, 39% were empirical, and 7% were categorised as "other". Evidence-based decision-making requires the "systematic application of the best available evidence to the evaluation of options and to decision making in clinical, management and policy settings" (Health Canada 2004, para 14). In many ways, empirical studies and reports are more likely to satisfy evidence-based criteria. However, concept analysis is valuable for gauging such divergent theories as environmental justice. Concept analysis serves to clarify, identify, and apply meaning to words and can be regarded as a building block for a theory (Baldwin and Rose 2009). As such, conceptual pieces have a necessary role to play in the evolution of environmental justice inquiry.

Ecological integrity

A variety of frameworks including those mentioned in the background piece of this paper and those derived from fields of study in human ecology, ecohealth, and ecological integrity are truly integrative approaches to applying ecological and systems thinking to issues of human and non-human health and well-being (Kartman 1967, Forget and Lebel 2001, Soskolne *et al*. 2007). For example, the analysis of population health differences from an ecological integrity perspective advances the fundamental importance of healthy ecosystems as the primary determinant of health for all species (Rainham *et al*. 2008). A significant finding here is the absence of ecological integrity in environmental justice definitions. The systematic review revealed that there is a small body of *environmental justice* scholarship dedicated to concepts relating to ecological integrity (specifically: Drake and Keller 2004, Hillman 2006), and outside of the review, we are aware of some disciplines and millennia-old worldviews that bridge the gap between the well-being of humans, non-human species, and ecosystems. As environmental justice is a prominent field of research, what is therefore needed is a way to communicate the importance of ecological integrity across disciplines and bring the concept into a more holistic definition of environmental justice.

Discussion

The aim of this systematic review was to elucidate who defines environmental justice, how it is defined, and to investigate if the literature acknowledges the interdependency of human beings and natural systems through the mention of ecological integrity. From the findings, we were able to draw parallels between the perspectives from which environmental justice is defined and the language chosen to define it. Community-based articles, for example, spoke to social justice concepts such as vulnerability; legislative articles spoke to matters of the fair distribution of goods in society; and, epidemiological articles spoke to the tracking of human health disparities and disease.

The results of the review indicate that the concept of ecological integrity is not integrated into mainstream conceptions of environmental justice. However, of particular interest, we found that the emergent theme of environmental health was most frequently cited in the Indigenous literature ($n = 3$, 38%). Links between human and non-human entities' well-being are deeply embedded in many Indigenous traditions, history, and knowledge (Castleden *et al*. 2009). For example, the Mi'kmaq principle of Msit No'kmaq, meaning "all my relations" (Mi'kmaq Spirit 2011) and the Nuu-chah-nulth principle of Hishuk ish Tsawak, meaning "all is one/connected", are powerful examples of how Indigenous worldviews can be applied to contemporary social–ecological settings to maintain the "essential balance of nature, or 'the web of life'" (Huu-ay-aht First Nation 2010). Indigenous science and traditional ecological knowledge share holistic characteristics that represent thousands of years of contact and experience with the local environment (Snively and Corsiglia 2001) and have the potential to influence innovative social–ecological opportunities to "reduce the burden on increasingly fragile ecosystems and foster sustainable, healthy prospects for future generations" (Stephens *et al*. 2007). As such, we propose that Indigenous scholarship may provide perspectives and evidence relating to ecological integrity, which in turn may be useful for re-articulating environmental justice from a holistic perspective.

Although environmental justice can be understood in a number of ways, it is most importantly a way of moving forward to achieve the common goal of reducing inequalities (Masuda 2008). A strategy to achieve this common goal would be to create and implement policy. However, the policy-making arena is highly political and rapidly changing, and the

transformation and utilisation of evidence into policy is influenced by the capacities, values, and beliefs, resources, and partnership links of individuals or organisations (Bowen and Zwi 2005). In other words, the policy-making process is vulnerable to the possibility of bias and may be influenced one way or another by individuals or organisations holding more power and access to resources, making the incorporation of emergent or less-conventional perspectives a potential challenge. At present, the United States has an explicit policy on environmental justice, while Canada and the UK do not. What do the findings of this review denote for policy creation (Canada and the UK) or policy modification (USA)? From a definitional standpoint, it can be argued that because ecological integrity is absent from environmental justice definitions, it will be overlooked in policy creation. Furthermore, the frequent reference to the EPA definition suggests that it has enormous potential to influence other policy frameworks. In revisiting and creating new frames for environmental justice, we urge activists and scholars to explore literature outside the mainstream in order to better incorporate the concept of ecological integrity. This includes Indigenous scholarship as well as scholarship on eco-justice and "just sustainability", the latter of which aims to link notions of environmental justice and sustainability and is gaining popularity in the UK (Agyeman and Evans 2004). Recognising that every research undertaking has its limitations, the findings of this study ultimately serve to strengthen the value of eco-justice, just sustainability, and Indigenous perspectives by providing a departure point for further exploration of such lines of inquiry and worldviews.

Conclusion

Environmental justice scholarship has emerged from a wide range of perspectives. Despite existing Indigenous and growing mainstream evidence indicating the interconnection between human and ecological health, the concept of ecological integrity has yet to penetrate environmental justice discourse. Scholars attending to the social construction of social problems have taught us that the power to define a problem is a necessary component of the ability to frame a solution to it (Spector and Kituse 1973). If environmental justice scholars who advocate for ecological integrity do not define it as such, it remains difficult to frame a solution to an injustice in this way. Therefore, a challenge is presented to scholars: to create space and a place for the integration of ecological interdependencies in environmental justice discourse.

Acknowledgements

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Notes

1. Where multiple definitions were present in one article, the most contemporary (and explicit) definition was analysed.
2. See Appendix 1 for citation list of 104 articles included in the systematic review.
3. See, for example, Allen and Gough 2006 (Appendix 1)
4. See, for example, Sen 2008 (Appendix 1)
5. "*n*" refers to the number of articles/themes.
6. Of the 21 articles categorised as legislative, authors used one of three environmental justice definitions: the EPA main page definition, the Executive Order definition, or the Department of Transportation definition. These *three* definitions were coded for their emergent themes which is why "$n = 3$" in the emergent theme results.

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