ENVIRONMENTAL JUSTICE: MAKING THE CASE FOR ECOLOGICAL INTEGRITY

by

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Submitted in partial fulfilment of the requirements
for the degree of Master of Environmental Studies

at

Dalhousie University
Halifax, Nova Scotia
December 2012

DALHOUSIE UNIVERSITY

SCHOOL FOR RESOURCE AND ENVIRONMENTAL STUDIES

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Dated: December 7, 2012

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DALHOUSIE UNIVERSITY

DATE: December 7, 2012

AUTHOR: Aelita K. J. Neimanis

TITLE: ENVIRONMENTAL JUSTICE: MAKING THE CASE FOR ECOLOGICAL INTEGRITY

DEPARTMENT OR SCHOOL: School for Resource and Environmental Studies

DEGREE: MES CONVOCATION: May YEAR: 2013

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Signature of Author

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ABSTRACT

The concept of environmental justice captures the notion that particular communities characterized by, for example, ethnicity or socioeconomic status, may be disproportionately affected by harmful environmental hazards. There is also evidence indicating that these same environmental hazards threaten non-human species, causing (sometimes irreversible) changes to the fundamental ecological services that support all life on earth. This study merges social and ecological determinants of health, two principles that should but rarely do intersect, by incorporating the concept of ecological integrity into a new environmental justice framework. A systematic review of 104 articles was carried out to analyze how environmental justice is currently defined in the literature. Study findings indicate that environmental justice discourse is anthropocentric and fragmented, that current approaches are reactive, and that environmental injustice requires participatory solutions. These findings guided the development of a new environmental justice model founded on the social-ecological concepts of resistance, resilience and restoration. The study further applies the concepts of the model through the processes of appreciation, assessment and action in a toolkit. The model and toolkit aim to improve human and non-human health outcomes by ultimately highlighting the interdependence between human and ecosystem health.

LIST OF ABBREVIATIONS USED

EIEJ Ecological Integrity for Environmental Justice

ACKNOWLEDGEMENTS

I would like to acknowledge and sincerely thank my co-supervisors, Dr. Heather Castleden and Dr. Daniel Rainham, for the countless hours they spent patiently helping me to articulate and clarify my often muddled thoughts in the wacky world of theory conceptualization.

I would like to thank Dr. Leith Deacon for acting as external examiner.

I also wish to acknowledge the support of the Social Sciences and Humanities Research Council of Canada for funding the development of this thesis through a Joseph-Armand Bombardier CGS Master's Scholarship. The Dalhousie Faculty of Graduate Studies, the Canadian Association of Geographers, and CoPEH – Canada also contributed funding for this research.

Finally, to my friends, family, and running shoes – thank you for keeping me sane.

CHAPTER 1: INTRODUCTION

1.1 Introduction

Environmental injustice is generally understood as the process by which certain social groups are burdened with environmental hazards (Pellow, 2000). Environmental justice arises from differential exposure to environmental threats that are unequally distributed along socioeconomic, ethnic, and gender lines (Brulle & Pellow, 2006; Cutter, 1995; London, Joshi, Cairncross, & Claudio, 2011). Policies and regulations insensitive to environmental injustice patterns can result in repeated exposures and can lead to more serious structural inequalities that intensify social, political, economic or biological disadvantage and the unequal burden of environmental threats (Masuda, Poland, & Baxter, 2010; Pellow, 2000; Stephens, 1996). The concept of environmental justice supports the principle that all individuals and communities have a right to equal protection under environmental and health regulations, and to meaningful involvement in decisions affecting their health (Bullard, 1996).

Aboriginal peoples[1] endure more exposures to environmental injustice because of unique physical, emotional, mental and spiritual ties to the land (Agyeman, Cole, Haluza-Delay, & Riley, 2009; Ford, Berrang-Ford, King, & Furgal, 2010; National Collaborating Centre for Aboriginal Health, 2010; Parkes, 2011; Richmond & Ross, 2008). In Canada, ongoing colonialism, racism, and social exclusion have led to unacceptable substandard economic, social and health and well-being indicators for Aboriginal peoples (Adelson, 2005; Ford et al., 2010; Loppie Reading & Wien, 2009; NCCAH, 2010). Disparities include unequal access to health care for proper treatment and documentation of illness (Loppie Reading & Wien, 2009), insensitivity to culture and perceptions of illness (NCCAH, 2010), and a normalization or downplaying of illness (Tang & Browne, 2008). Despite these disparities, Aboriginal peoples in Canada have "largely led the charge against the uneven and underlying political, social and ecological processes that generate

[1] In Canada, "Aboriginal peoples" refers collectively to the original peoples of North America and their descendants, and includes First Nations, Metis, and Inuit peoples (Aboriginal Affairs and Northern Development Canada, 2012).

local and regional environmental and social injustices" (Mascarenhas, 2007, p. 575). In doing so, Aboriginal peoples strengthen their unique conceptualizations of health and healing. Their worldviews are often centered on an interconnected collective (rather than individual) system, a system that emphasizes balance amongst human and non-human communities as a determinant to wellbeing (Castleden, Garvin, & Huu-ay-aht First Nation, 2009; McGregor, 2004; Richmond & Ross, 2008).

To illustrate how environmental injustices manifest themselves, and the intricate ways in which human and non-human communities are disturbed, a fictional composite sketch is presented. The sketch outlines the experiences of Driftwood First Nation, a community characterized by the same inequalities that many other First Nations endure in Canada. Composite sketching is a method of storytelling commonly used by critical race theoreorists (e.g. Solorzano & Bernal, 2001). It is a research method that seeks to provoke social change by evoking more emotion from readers than traditional research methods (Sandelowski, Trimble, Woodard, & Barroso, 2006). To create a composite sketch, "data" are collected on the experiences of people of colour, or more broadly, marginalized populations, and is analyzed to create characters that can then be placed in social, historical and political situations that discuss subordination (Solorzano & Yosso, 2002). Composite sketches and their characters are "grounded in real-life experiences and actual empirical data and are contextualized in social situations that are also grounded in real life, not fiction" (Solorzano & Yosso, 2002, p. 36), thus preserving individual and community anonymity while highlighting a collective experience. Data can include that which is gathered through primary research, existing literature, and personal and professional experiences (Solorzano & Yosso, 2002). In presenting critical composite sketches, the stories and experiences of traditionally disregarded populations can be represented through a smaller subset of characters (Harper, 2009). The following section tells the story of environmental injustice in Driftwood First Nation.

1.2 Driftwood First Nation: Threats to Social-Ecological Well-Being

The people of Driftwood First Nation have a deep appreciation for their surroundings and have thrived in eastern Canada for thousands of years. With an on-reserve population of 400 people, and full membership population of 575, Driftwood First Nation is situated on the banks of Otter River in Atlantic Canada. As with many other First Nations, the local surroundings of Driftwood First Nation have shaped the spiritual, economic, political and social essence of their culture, and in turn, the well-being of the Driftwood First Nation people is closely connected to their surroundings. Twenty-five years ago, following an eight year economic recession that put significant strain on the community, a steel mill was proposed for a location just a few kilometers up-river from Driftwood First Nation. The location was considered to be highly desirable from the perspective of the owners as they perceived the area to be relatively unoccupied and unused. The steel mill was presented to Driftwood First Nation as an opportunity to create jobs and stimulate the local economy. The development was supported by members of the government, industry, scientists, citizens residing in the area as well as some members of the First Nation, who were enthusiastic about the prospect of employment. Wary of the environmental and social threats that the mill could pose for the surrounding community, the Driftwood First Nation Chief and Council raised concern with both the local government and industry. Despite their apprehensions, the steel mill was approved and constructed after an environmental assessment was completed.

Today, twenty-five years later, the social-ecological degradation in the region has proved devastating, and the Driftwood First Nation has recognized that the community was severely misled in what is yet another case of environmental injustice in Canada (see, for example: Agyeman et al., 2009; Mascarenhas, 2007). For the Driftwood First Nation, the operation of the steel mill resulted in severe environmental contamination; the lake water and soil became heavily contaminated with toxins; clouds of toxic fumes hovered in low-laying areas, and animals began to disappear from the landscape; children started to develop skin rashes and began getting frequent nose-bleeds; chronic diseases like asthma and cancer, once rare became more prevalent and exponentially higher than

the national average. Limited resources and capacity largely the result of systemic racism and social exclusion restricted Driftwood First Nation's ability to lobby against the construction of the steel mill and now for wanting to see it closed and the site remediated. Traditional uses of land spiritually, recreationally and for subsistence purposes were not acknowledged in the environmental assessment process, facilitating the perpetual environmental degradation.

Perhaps one of the most consequential oversights in the case of Driftwood First Nation was a seeming inability on behalf of decision-makers to think about the health of the community in relation to the health of the ecosystem. Such oversights are not unique to issues of development; decisions are being made across a number of sectors in which humans have been isolated from the environment (see, for example: Belsky, 2002; Costanza, 1996). Over the past two centuries, knowledge (as it is created and translated in the western world) has become increasingly fragmented and specialized in an effort to make complex, interconnected systems more manageable (Costanza, 1996, Rapport et al., 1999). Fragmentation and reductionism have arguably shaped the relatively new concept of environmental justice. In their reduction of environmental justice to simply a matter of hazardous waste facility siting, for example, Yandle and Burton (1996) failed to take into account sociohistorical context and procedural justice processes in making assumptions about environmental justice (Bullard, 1996). Although the field of environmental justice inquiry examines the links between the state of the environment and humans, such links are being made insofar as they affect human health, rather than from an ecosystems perspective, which values the mutual benefits that healthy human and ecological systems provide for one another (Neimanis, Castleden & Rainham, 2012). In the case of Driftwood First Nation, for example, if industry, government, and other actors had considered the services that ecosystems provide for human and non-human well-being, they might have had the foresight to avoid the environmental degradation found in the Driftwood First Nation's traditional territory. An environmental justice approach which merges the two is a (re)expression of a holistic, respectful and cooperative approach to health and well-being that has been cultivated by Aboriginal peoples for millennia (McGregor, 2004; Parkes, 2011).

1.3 Structure of Thesis

This study seeks to interrogate the current environmental justice framework to find any gaps in the literature by analyzing how environmental justice is currently defined through a systematic review. The study also seeks to introduce the value of ecological integrity vis-à-vis a new conceptual model that merges environmental justice and ecological integrity through theory-building and to ultimately, seeks to highlight the interdependence between human health and ecosystem health by creating a toolkit that applies the concepts of the new model to help communities maintain ecological integrity alongside environmental justice.

This thesis follows a thesis-by-papers format. It is presented as four chapters. Chapters 2 and 3 are independent manuscripts, and therefore, have their own abstracts, introductions, methods, discussions and references. Chapter 2 outlines the systematic review, while Chapter 3 outlines the creation of the model and toolkit. Chapter 4 synthesizes the thesis with a brief application of the model to the case of Driftwood First Nation, summarizes key findings, the research contributions and limitations, and provides recommendations for future research and concluding comments.

1. 4 Operational Definitions

The concepts of environmental justice, ecological integrity and health and well-being provide the foundation for this thesis. These terms, however, do not have static definitions; they have been characterized from numerous perspectives and have evolved to represent an array of beliefs and practices. The following operational definitions have been selected to serve as a point of departure from which to explore more comprehensive understandings of the concepts as they relate to each other.

1.4.1 Environmental Justice

Environmental justice, as defined by the United States Environmental Protection Agency (2009), is:

> [t]he 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…[and] 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.

Although this definition and associated policy exists as a signpost to help guide decisions related to environment and health, disparities in mortality, morbidity and disability in Canada and the United States are growing (Brulle & Pellow, 2006; Mascarenhas, 2007). The term environmental injustice is used to identify instances when a specific community disproportionately bears the burden of environmentally harmful practices (Bryner, 2008; Bullard, 2007; Cole & Foster, 2001; Foster, 1993). Such communities in industrialized nations are most frequently characterized by low socioeconomic status, and are often identified as belonging to visible minorities. In Canada, differences in "urban geography, racial dynamics, the history of resource development, multiculturalism, social movements and social policies" (Haluza-Delay, 2007, p. 557) have created a unique pattern of environmental injustices, which often affect Aboriginal peoples, probably more so than any other population in Canada (Mascarenhas, 2007).

The environmental justice movement emerged from the broader Civil Rights movement of the 1950s, and much of the early research published on environmental justice in the United States examines the correlation between communities of colour and less-desired uses of land (Bullard, 1996; Cole & Foster, 2001). Evolving alongside the related anti-toxics, labour, Native American and environmental movements (Cole & Foster, 2001; Haluza-Delay, 2007), the environmental justice movement has since

extended its scope to include research on, for example, poor air quality, hazardous waste sites, demographic representation in high-risk occupations, and exclusion from decision-making processes (see, for example, Agyeman et al., 2009; Brulle & Pellow, 2006). More recently, greater focus has been given to environmental-related health disparities that occur not only within countries, but also between countries globally (Agyeman, Bullard, & Evans, 2002).

Justice can be achieved through reactionary and precautionary practices. Many early conceptualizations of environmental justice focus primarily on the reactive notion of distributional justice. Environmental justice, in this context, refers to the belief that all environmental burdens and benefits should be divided equally among all communities in a society (Vaughan, 1995). Although useful for identifying the fault lines along which environmental injustices travel, purely distributional approaches for addressing injustices do so only after they have already occurred. Procedural justice, which emerged in the literature in the early 1990s, extends beyond this 'fair-share' notion by requiring a precautionary examination of how decisions are made (Schlosberg, 2007). Procedural justice proposes that if all groups are given the opportunity to participate in decision-making processes, injustices can be averted before their manifestation. This still holds weaknesses and so contemporary definitions of environmental justice have also incorporated generational (Cutter, 1995; Westra, 2008) and recognitional (Schlosberg, 2007) components. Generational justice aims to ensure that current practices keep the best interests of future generations in mind, while recognitional justice aims to legitimize the traditionally invisible values, identities and expertise of marginalized populations. Environmental justice clearly contains many elements, which are constantly evolving. Descriptions can address injustice upstream or downstream, and can align with principles of sustainable development by ensuring inter and intra-generational equity and recognition of values regardless of ethnicity. The definition of environmental justice used in this study is the United States Environmental Protection Agency definition. As it is not a comprehensive definition, it serves as the impetus for this study, and is used as a departure point for deeper analysis of the concept.

1.4.2 Ecological Integrity

Ecological integrity, which first emerged in Aldo Leopold's (1949) statement on land ethics, merges the two components of ecosystems and integrity into one concept. Ecosystems can be identified by their structure, function, composition and processes (Noss, 2000), and are complex due to the diverse interactions that occur between both biological and physical components (Andreasen, O'Neill, Noss, & Slosser, 2001). Integrity is defined as something that is intact and exhibits wholeness (Andreasen et al., 2001). Specifically, when a system has integrity, it is often in an unimpaired condition, and exhibits qualities of wholeness and comprehensiveness (Noss, 2000; Pimentel, Westra, & Noss, 2000). Ecological integrity, therefore, is the summation of the structural, functional, compositional and procedural elements of an ecosystem occurring within their natural ranges of variation, furthermore giving it the ability to withstand and recover from disturbance (Parrish, Braun, & Unnasch, 2003). Definitions can include the concepts of sustainability, naturalness (Andreasen et al., 2001), vigor, organization, and survival despite damage to neighbouring systems (Rapport, Costanza, Epstein, Gaudet, & Levins, 1998). The definition of ecological integrity used in this study is the potential, stability, capacity for self-repair, independent management of an ecosystem (Karr, 1992).

Although ecology and integrity converge neatly into the concept of ecological integrity, indicators of ecological integrity are not so easily measured. First, it is difficult to determine the unimpaired condition of an ecosystem, as few, if any, unimpaired ecosystems exist and much of the available knowledge on ecosystems is incomplete (Carignan & Villard, 2002). Second, the concept of integrity is subjective. Interpretations of integrity, wholeness or health, for example, are laden with social, political, ethical and even economic values, and can be manipulated to reflect a vision based on a set of human beliefs (Carignan & Villard, 2002). While it is impossible to predict the exact behaviours of ecosystem components and difficult to establish consensus on the essence of integrity in relation to dynamic ecosystems, "management and policy decisions require information on the status, condition, and trends of ecosystems" (Andreasen et al., 2001, p. 22). It is therefore useful to have a working definition of ecological integrity that

represents an integrated interpretation of health in which "biophysical processes sustain the lives of species and individuals, and reciprocally, the interactions of life forms sustain the support systems" (Karr, 1993, p. 299). Frequently used in regulatory and legislative documents such as the United States Clean Water Act, a definition of ecological integrity can help to shed light on the health of an ecosystem (Westra, 1996).

1.4.3 Health and Well-Being

Definitions of human health can be positioned on a spectrum. Conceptions range from restricting health to the biophysical person, to more broadly encompassing mental and spiritual health components and capacity to contribute meaningfully as a member of society (Weinstock, 2011). Health from a broad perspective, as defined by the World Health Organization, is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948, para. 1). This state is "determined by complex interactions between social and economic factors, the physical environment and individual behaviour" (Public Health Agency of Canada, 2012, para. 3), which confront individuals and communities at all points of their life cycle. The Public Health Agency of Canada recognizes 12 key determinants to human health, including income and social status, health services, gender and culture to name a few (PHAC, 2012). Culture, for example, refers to the understanding that ethnic communities may have different understandings of health and may manifest, express, cope and seek treatment for health concerns in different ways (Adelson, 2005, Levin & Browner, 2005; NCCAH, 2010). While the Public Health Agency of Canada recognizes the physical environment as a determinant of health, the Agency frames the environment as a source of illness; it states that *contaminants* in the air, water and soil, for example, can lead to a number of *adverse* health effects for humans (PHAC, 2012). Alternatively, the use of ecological integrity as a determinant of health highlights the ecosystems services that allow human and non-human species to flourish (Parkes, 2011).

Although they can appear interchangeably in literature, health and well-being are not necessarily synonymous. While both refer to the welfare of an individual or

community, health can be interpreted as an inherent and simultaneously instrumental *component of* well-being (Salomon et al., 2003). Well-being can encapsulate health as well as non-medicalized features of welfare including, for example, peace and purpose (Salomon et al., 2003). It can refer to the personal conceptions people have about their own life satisfaction and feelings, ranging from depression to joy, and relating to employment or family (Centers for Disease Control and Prevention, 2011). Health and well-being, therefore, do not only represent a state; they can be understood positively as capacities and the *process* of achieving a population's (human or non-human) goals (McDowell, Spasoff, & Kristjansson, 2004) as they are situated within particular social and environmental contexts. Health and well-being in the context of this study are understood broadly as a state of wholeness that is influenced by both social and environmental determinants, and is examined as a collective concept. While a definition of health is summarized above, the goal in the proposed environmental justice process is ultimately to let communities decide for themselves their own definition of health.

1.5 Problem Statement

Environmental justice has been well-established simultaneously as a field of inquiry, a conceptual framework and a political ideology (Masuda, 2008). The swell of research on the topic in recent years (Holifield, Porter, & Walker, 2010) can be linked to the widespread and rapid changes to ecosystems (Millennium Ecosystem Assessment, 2005), which have resulted in environmental devastation, depletion and extinction (The Earth Charter Initiative, 2010; Kahn, Severson, & Ruckert, 2009). While environmental justice inquiry has captured how the consequences of resource overharvest, soil and water depletion, chemical contamination and global climate change (Karr, 1993), for example, disproportionately affect particular human populations, it is not clear whether inquiry captures injustices to other species or the integrity of ecological systems that support all life on earth.

Human development and the health and sustainability of other species are deeply reliant on ecosystem services (Farber et al., 2006; Karr, 1993; Millennium Ecosystem

Assessment, 2005; The Earth Charter Initiative, 2010). Although the well-being of humans, non-human species and ecosystems are interdependent (Gottlieb, 2004; Katz, 1994; Norton, 2003; Rapport et al., 1998; Soskolne, 2008), the western tradition of separating the relationship between humans and nature spans millennia (Burger et al., 2008, Grun, 2005; Plumwood, 1993). This very distinction is articulated in contemporary society through environmental justice theory. The environment is seldom seen as a determinant to health and moreover, the natural world has been framed as a source of illness rather than a system of natural processes that sustains all life on earth (Parkes, 2011; Rainham & McDowell, 2005; Rainham, McDowell, & Krewski, 2008). Some populations are left to contend with greater environmental deficits than others, and current environmental justice frameworks do not adequately account for and evaluate all determinants to health (social and ecological) (Agyeman et al., 2002; Agyeman & Evans, 2004). The challenge, therefore, is to re-conceptualize an environmental justice framework to view human and ecological interdependencies together as social-ecological systems. This thesis merges social and ecological determinants of health, two principles that should but rarely do intersect, by incorporating the concept of ecological integrity into a new environmental justice framework.

1.6 Research Question

In light of the problem statement presented above, this thesis seeks to answer the following research question: How can an environmental justice framework be re-conceptualized to include the concept of ecological integrity?

1.7 Research Purpose and Objectives

The purpose of the thesis is three-fold: (1) to interrogate the current environmental justice framework to find any gaps; (2) to introduce value of ecological integrity vis-à-vis a new conceptual model; and (3) to ultimately highlight the interdependence between human health and ecosystem health (Soskolne, 2008; Waddok, 2011; Westra, 2008). To fulfill this purpose, three objectives were identified:

1) Analyze how environmental justice is currently defined in the peer-reviewed literature;
2) Develop a model that merges environmental justice and ecological integrity, and;
3) Create a toolkit that applies the concepts of the new model to help communities maintain ecological integrity alongside environmental justice.

The first objective is fulfilled through a systematic review of the literature on environmental justice (Chapter 2). Building upon the results of the systematic review, the second and third objectives were accomplished through theory-building, a research method which facilitates the formulation of frameworks that helps researchers to understand and address complex problems (Chapter 3). Specific methods are summarized below.

1.8 Research Design

This thesis makes the case that the current conceptualization of environmental justice is anthropocentric and fragmented, and that human and non-human health outcomes can be improved if environmental justice is approached from a more holistic perspective. To advance this perspective, the thesis re-conceptualizes the current environmental justice framework by introducing the concept of ecological integrity. Grounded in the results of a systematic review, the thesis then presents a model and toolkit, which offer mechanisms to propel environmental justice as a new theory into application.

1.8.1 Systematic Review

Systematic reviews follow a general formula: ask a question, clarify scope, search for evidence, appraise primary studies and extract data, synthesize evidence and draw conclusions, and disseminate, implement and evaluate (Pawson, Greenhalgh, Harvey, & Walshe, 2005). The systematic review undertaken for this thesis followed the same

formula. To determine how environmental justice is defined in current literature, how the concept is operationalized across a variety of paradigms, and if ecological integrity is present in definitions, a title search of the term "environmental justice" was performed across four databases. The inclusion criteria for the review were refined four times based on retrieval results, bringing the original number of possible articles down from 2000+ to the final 104 included in this review (see Appendix A: Citation list of 104 articles included in the systematic review). Specifically, the articles included in the systemic review were based on the following criteria:

i.) Published in English between the years 2000 and 2010;
ii.) Accessible through the library catalogue at the time of review;
iii.) Not a review of an article or book;
iv.) Written with a succinct definition of environmental justice and;
v.) Complete with an interpretation of a vulnerable population and a specific injustice.

Articles that met the inclusion criteria were compiled in an extraction sheet for standardization, and thus began the coding structure. To determine *who* is defining environmental justice, articles were allocated to an epistemological category based on title and article keywords, journal of publication and definition of vulnerable population and injustice. To determine *how* environmental justice is defined, and if definitions included ecological integrity, each definition in the summary table was carefully read 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 and categorized. After coding each definition, the keywords were compiled and associated with an emergent theme.

1.8.2 Model and Toolkit

Theory-building is a method of scholarly inquiry that provides a novel way of looking at complex problems (Lynham, 2002) and as such, is used to fulfill the second

and third objectives. Theory describes and explains how things work; theory-building is the process of creating, applying and adapting theory (Lynham, 2002). Lynham (2002) describes the five phases of theory-building as the following:

1) Conceptual development;
2) Operationalization;
3) Application;
4) Confirmation or disconfirmation, and;
5) Continuous refinement and development

The order in which a researcher completes the five phases of theory-building is a reflection of the nature of the research (Lynham, 2002). As such, theory-building for this study begins in the application phase. A survey of literature applying environmental justice theory indicates that scholars are not acknowledging a healthy environment as a determinant of human and non-human health. This discovery leads to the refinement and development phase, where thoughts on how to improve an environmental justice framework are formulated. In this phase, it is determined that the addition of the concept of ecological integrity to the theory could foreground the impact that environmental disturbances have on human and non-human health. The results of the systematic review help to guide the conceptual development phase of the processes. At this stage, key ideas that depict the new model are formulated from existing models and the literature. Variables are defined and their relationships to one another are theorized. Conceptual development transitions to the operationalization phase through the development of the toolkit, where the components of resistance, resilience and restoration are transferred to the stages of appreciation, action and assessment through a series of questions. The research agenda is evaluated in the confirmation/disconfirmation phase. Knowledge claims are validated and the model is applied to the composite sketch to see if it really does foreground ecological integrity. The theory-building process described above also fits with Wacker's (1998) general procedure for theory-building, which includes: definitions of variables (e.g. resistance, resilience and restoration), limiting the domain

(e.g. environmental injustice scenarios), relationship (model) building, and theory predictions and empirical support (i.e. substantiating literature).

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CHAPTER 2: EXAMINING THE PLACE OF ECOLOGICAL INTEGRITY IN ENVIRONMENTAL JUSTICE: A SYSTEMATIC REVIEW

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Published in Local Environment: The International Journal of Justice and Sustainability (2012), 17(3), 349-367.

2.1 Statement of Student Contribution

A. Neimanis was responsible for the data collection, analysis and writing of all sections of this manuscript. H. Castleden and D. Rainham contributed equally in supervising the development of the manuscript and provided editorial revisions and feedback throughout.

2.2 Abstract

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 three-fold. 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 operationalized 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.

2.3 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 (Bullard, 2005; Cole & Foster, 2001; Cutter, 1995). Evolving with an anthropocentric focus, the United States Environmental Protection Agency (USEPA) created the following definition in 1994 to operationalize 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.*

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 USEPA definition (Holifield, Porter, & Walker, 2010), resulting in a diverse collection of conceptual and operational definitions (Scholsberg, 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.

2.4 Background

Research on environmental justice focuses on identifying patterns of environmental inequity and describing the historical processes underlying these patterns (Brulle et al., 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 & 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 & Pellow, 2006; Agyeman, Cole, Haluza-Delay, & O'Riley, 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, Zupancic, Poland, & Cole, 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 & 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 percent 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, Westra, & Noss, 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 related ecological maladies. Some disciplines *have* merged the goals of social and ecological justice. Environmental education (see: Bowers, 2001; McLaren & Houston, 2004; Mueller, 2009) and eco-theology (see: 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 operationalized 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.

2.5 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 summarize 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 synthesizing large volumes of literature because they are condensed, verifiable, replicable and readable as final products (International Development Research Centre, 2008). In synthesizing large amounts of research literature, systematic reviews often fulfill 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, Manheimer, & Glanville, 2009). As there are thousands of articles written on environmental justice, inclusion criteria for this review were refined four times during the retrieval process (see Figure 2.1: Inclusion criteria process). Reviews restricted to one database are often insufficient (IDRC, 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 from search results. For this reason, and because they do not always provide complete documents and can take anywhere from three months to two years to recognize updated document information (Google, 2011), commercial search engines were excluded from this review.

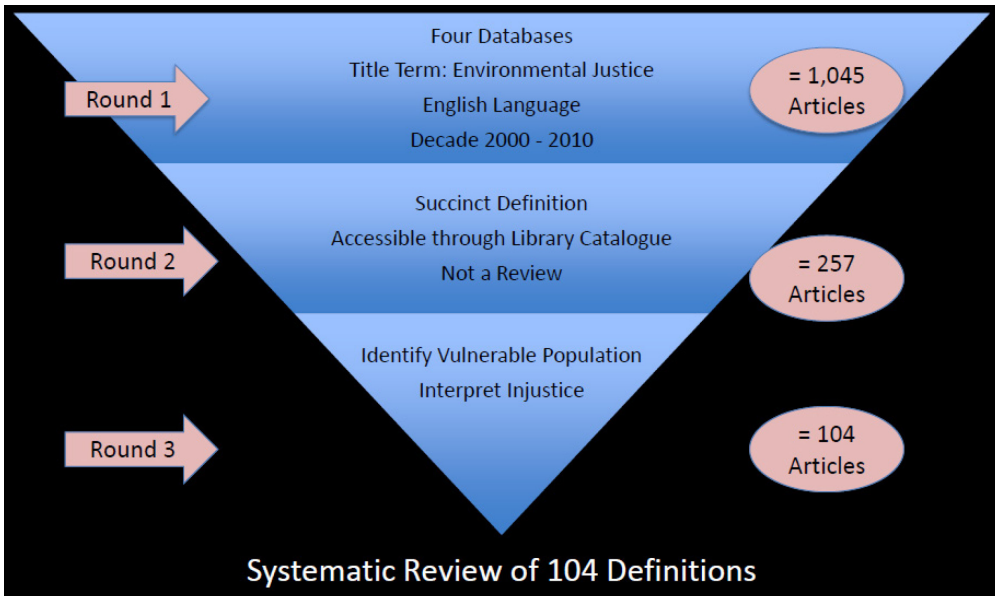

Figure 2.1: Inclusion criteria process

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 2,000 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 1,045 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 Atlantic

Canada, it is Atlantic Canada'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[2,3]. Each article selected for a full review underwent standardized 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 operationalized across these paradigms.

2.6 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 –

[2] Where multiple definitions were present in one article, the most contemporary (and explicit) definition was analyzed.
[3] See Appendix A for citation list of 104 articles included in the systematic review.

who is using environmental justice – each article was appraised and grouped into one of seven epistemological categories: community-based, legislative, epidemiological, Indigenous, procedural, feminist and environmental health. 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.

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, Eng, Schulz, & Parker, 2005; Wallerstein & Duran, 2010). Articles grouped in the community-based category were characterized by keywords and themes relating to alternative and community-based participatory research methods and international and local grassroots movements.

Legislative

The US 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 USEPA definitions of environmental justice. Of the 21 articles in this category, 15 authors referenced the USEPA main definition (see *Introduction* of this paper), five authors referenced the Executive Order definition[4] and one referenced the Department of Transportation definition[5]. These articles were characterized 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

[4] See, for example, Allen and Gough 2006 (Appendix A)
[5] See, for example, Sen 2008 (Appendix A)

more specifically concerned with environmental factors in disease (Thomas, 2009). The 20 articles grouped into the epidemiological category were characterized 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 decolonize 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, Lincoln, & Smith, 2008). These articles were characterized 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 characterized by keywords and themes relating to policy, policy review, legal cases and environmental regulations.

Feminist

Feminist scholarship analyzes and challenges dominant epistemological and institutional paradigms often from the standpoint of the disadvantaged to promote equity (Sprague, 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, recognize 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 , Panelli, & Weinstein, 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.

2.7 Findings 2: How is Environmental Justice Operationalized?

After identifying *who* in the literature included for the systematic review is defining environmental justice, we wanted to examine *how* definitions of environmental justice are operationalized 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 compiled and associated with an emergent theme (see Table 2.1: Emergent themes and their associated keywords). The following eleven 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.

Table 2.1: 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.

Of the emergent themes, vulnerable populations, the biophysical landscape, human health and distributive justice were most frequently referenced (see Figure 2.2: Frequency of emergent themes). 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%) 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 characterized 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 sparsely populated and rural areas or

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

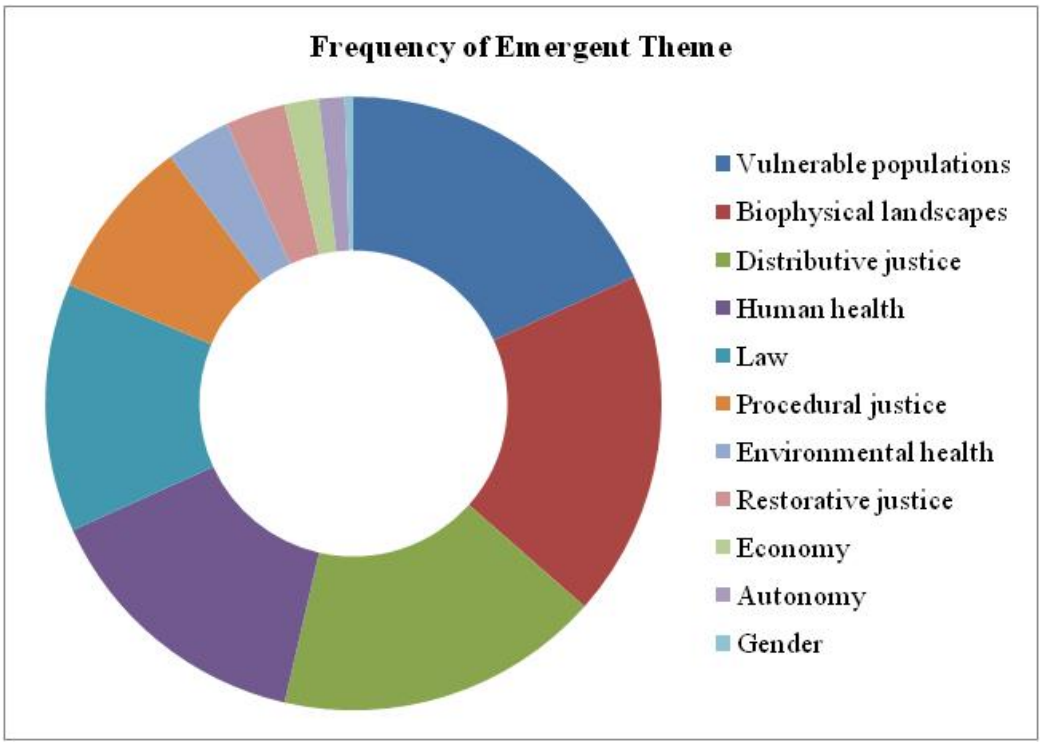

Figure 2.2: Frequency of emergent themes

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 definitions second to vulnerable populations and the biophysical landscape. This finding is striking as many environmental justice advocates now recognize 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).

2.8 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.

2.8.1 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)[6], followed by legislative (n=21) and epidemiological articles (n=20) (see Figure 2.3: Number of articles for each of the seven epistemological categories). 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%)[7]. Of the epidemiological articles, the theme that emerged with the most frequency was human health (n=18, 90%).

[6] 'n' refers to the number of articles/themes.

[7] Of the 21 articles categorized as legislative, authors used one of three environmental justice definitions: the USEPA 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.

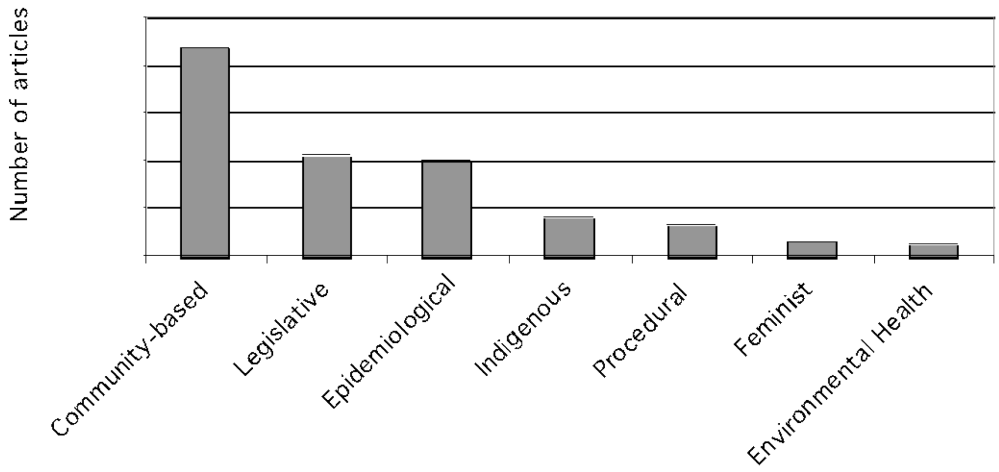

Figure 2.3: Number of articles for each of the seven epistemological categories

The environmental justice movement emerged as a grassroots movement (Cole & 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 marginalized populations to improve quality of life, it comes as no surprise that community-based participatory researchers are the primary contributors to 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 amongst all agents. Nearly sixty years after the advent of the watershed Civil Rights Movement, considered to be a foundation of the environmental justice movement, (Cole & 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.

2.8.2 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, Reeves, & Batchelor, 2005), along with the observation that in many circumstances, women have been the leaders in the fight for environmental justice (Rainey & 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.

2.8.3 Primary Definition

Of the 104 tabulated definitions, the USEPA 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 USEPA definition an easily accessible, commonly known, default definition. Second, the USEPA 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 USEPA 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-conceptualize the definition.

2.8.4 Study Designs

Of the articles reviewed for this study, 54 % were conceptual, 39% were empirical and 7% were categorized 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 & Rose, 2009). As such, conceptual pieces have a necessary role to play in the evolution of environmental justice inquiry.

2.8.5 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 wellbeing (Kartman, 1967; Forget & Lebel, 2001; Soskolne, Butler, Ijsselmuiden, London, & von Shirding, 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, McDowell, & Krewski, 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 & 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.

2.9 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, Garvin, & Huu-ay-aht First Nation, 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 & 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, Parkes, & Chang, 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 utilization of evidence into policy is influenced by the capacities, values and beliefs, resources and partnership links of individuals or

organizations (Bowen & 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 organizations 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 United Kingdom do not. What do the findings of this review denote for policy creation (Canada and the UK) or policy modification (US)? 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 USEPA 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 & Evans, 2004). Recognizing 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.

2.10 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 & Kittuse, 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.

2.11 Acknowledgements

The authors would like to thank two anonymous peer-reviewers for their constructive comments on an earlier draft of this manuscript. Any errors or omissions remain our own.

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CHAPTER 3: A MODEL AND TOOLKIT FOR INTEGRATING ECOLOGICAL INTEGRITY WITH ENVIRONMENTAL JUSTICE

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Prepared for Submission to Local Environment: The International Journal of Justice and Sustainability

3.1 Statement of Student Contribution

A. Neimanis was responsible for the research, analysis, conceptualization of the model and toolkit, and writing of all sections of this manuscript. D. Rainham and H. Castleden contributed equally in supervising the development of the manuscript and provided guidance, suggestions and editorial comments throughout the writing process.

3.2 Abstract

The results of a systematic review published in this journal last year indicate that the concept of ecological integrity appears to be absent from definitions of environmental justice. The purpose of this paper is three-fold. First, we explore the anthropocentric way in which environmental justice is currently framed. Second, we provide a re-conceptualized environmental justice model that bridges social and ecological communities. Third, we present a toolkit that operationalizes the concepts of a new model of environmental justice. The model and toolkit draw on existing frameworks, ecosystems and sociological literature to create conceptualizations of resistance, resilience, restoration, appreciation, assessment and action that incorporate both ecological and social components, with the goal of improving both human and non-human health outcomes.

3.3 Introduction

Systemic inequalities such as racism, sexism or classism may result from the unequal distribution of power and access to resources in societies (Davison et al., 2006). As a response to systemic inequalities, social justice advances the principles of the fair distribution of a society's benefits, responsibilities and their consequences through the provision of employment, social protection and social dialogue (Davison et al., 2006; International Labour Organization, 2008). The concept of environmental justice is a central tenet of social justice theory, but more closely explores the relationships between human-caused environmentally harmful actions and their consequences, and the human communities that disproportionately bear these burdens (Bullard, 2005; Cole & Foster, 2001; Cutter, 1995)

Environmental justice has evolved over three decades as a social movement and political framework, and has been the subject of much academic research. Despite the maturity and the large volume of literature published on environmental justice (Neimanis, Castleden, & Rainham, 2012), communities across the globe are still fighting for environmental justice. Furthermore, the framework itself is still the subject of much scrutiny (Masuda, Poland, & Baxter, 2010). Pellow and Brule (2005), for example, have called on environmental justice advocates to more critically frame the movement from within the context of the broader social systems that perpetuate inequality and environmental degradation. The combination of these observations indicates that many key players involved in this particular line of inquiry are unsatisfied with the current state of affairs. As such, it has become necessary to ask: what is it about the current approach to environmental justice that needs improvement?

The aim of this paper is to examine more fundamentally the way in which we approach complex social-ecological problems such as those that are characterized as environmental injustices through three inter-related objectives:

1) to shed light on the anthropocentric way in which environmental justice is currently framed;
2) to provide a re-conceptualized environmental justice model that bridges social and ecological communities, and;
3) to present a toolkit that proposes to operationalize the concepts expressed in a new model of environmental justice.

3.4 Environmental Justice from an Anthropocentric Perspective

Humans are intricately connected to the environment and both humans and non-human species are deeply reliant on ecosystem services for survival (Rainham & McDowell, 2005). Prevention of environmental injustice requires careful inspection of the state of the environment (ecosystems) within which people live. While the literature on environmental justice is abundant with descriptions of the environmental burdens certain communities have come to bear (Schweitzer & Stephenson, 2007), studies often focus on single issues without providing alternative and sustainable courses of action for individuals, communities and institutions (Hanson, cited in Edwards, 2011). Moreover, despite the fundamental role that ecological integrity plays in human development and well-being, widespread environmental justice discourse appears to be anthropocentric (Neimanis et al., 2012). Environmental injustice inquiry ought to acknowledge the mutualistic relationship between human and non-human species and take into account the requirement of healthy ecosystems for healthy communities (Rainham & McDowell, 2005). This human/ecosystem disconnect is not unique to the field of environmental justice, and can, in fact, be traced back to centuries-old philosophies and religious teachings (e.g. Cartesian dualism, Hobbes' association between irrationality and nature, and Christian dominion over nature).

The bifurcation of the public health and environmental fields has resulted in negative health outcomes that marginalized populations in particular have had to absorb (Lee, 2002). It is a distinction that is reflected across many disciplines in contemporary, mainstream Western society (e.g. through granting the natural environment value only

after it has been deemed desirable for human consumption (Castleden, 2009; Plumwood, 1993)). Even environmentalists and social justice advocates have been pitted against each other in the pursuit of conservation and equality, as the environmental movement has been traditionally portrayed as elitist and conservationalist (Agyeman & Bullard, 2002), and has been interpreted as putting the needs of the non-human species before those of people. The distinction between human and ecological systems that is perpetuated across many disciplines is arguably a result of a long history of human dominion and superiority over nature, which is rooted in dualistic popular philosophy and Christian teachings (Lauer & Aswani, 2009; White Jr., 1967). The scientific practice of objectifying nature has fragmented our understanding of complex, social-ecological systems, partially because humans continue to view themselves as being the only point of reference from which to approach complex social-ecological problems (Grun, 2005). Though the human/nature dichotomy has been perpetuated by some populations for centuries, such a belief system threatens the very health of human and non-human communities because these belief systems do not acknowledge interdependence. In the field of environmental justice, a reconciliation process can begin with reconsidering how communities are defined.

3.5 Understanding Community

Current definitions of environmental justice capture the human elements of a community. As communities are the unit of analysis for most environmental justice inquiry, it should follow that the anthropocentric interpretation be reconsidered in order to improve an environmental justice framework. Therefore, it is important to reconsider how the unit of analysis – community – is defined. Representations should reflect the ecological integrity perspective that all species (human and non-human) are reliant on the services ecosystems provide, and more fundamentally, are dependent on ecosystems that are functioning properly (Rapport et al., 1998), as it is the resiliency of ecosystems that provides the foundation for healthy human development (Karr, 1992; Rapport et al., 1998).

Individuals inherently have a sense of what their own community looks like, and are able to identify features and the behaviours of the actors within it. Some disciplines specifically study the interactions and relationships between community components. For example, *ecology*, originating from the Greek word oikos, meaning "a place to live", is a discipline which works at "characterizing the patterns seen in nature, studying the complex interactions among organisms and their environments, and understanding the mechanisms involved in biological diversity" (Smith & Smith, 2001, p. 3). Another, *human ecology,* is concerned specifically with the way humans organize, model and are modeled by their surrounding environment (Hawley, 1986). Not only does the physical environment of a community constantly change, but the opinions and alliances of the people living with a given community can also shift. Furthermore, diversity, both ecologically and culturally, creates an environment in which not all members share the same needs, problems or perspectives. A community, therefore, is a flexible entity in that its "scope of scale, components, and relationships [can be] set by the observer depending on the object of interest [e.g. environmental injustice] at hand" (Bates & Tucker, 2010, p. 5).

While community can be defined on a case-by-case basis, there are three essential elements common to most definitions: a sense of *place, common ties, and social interaction* (Hillery, 1955, as cited in Driskell & Lyon, 2002). Community for this paper, therefore, refers to all human and non-human members that are affected by injustice through shared place, experiences and interactions. What is missing from most environmental justice inquiries is an examination of how *ecological interactions* and *interdependencies* modify and are modified by the communities they are a part of. Understanding how these complex social-ecological interactions modify and are modified can be confusing and challenging, but it can be done by examining them in relation to specific dimensions of a community (see, for example, Shookner's dimensions for understanding social and economic exclusion and inclusion, 2002) For this reason, literature was surveyed to identify common community dimensions.

Shookner (2002) identifies eight dimensions from which to measure social and economic exclusion. Six of these dimensions were chosen to be the focus for this paper: culture, economy, politics, structures, environment and relationships (functional and participatory dimensions were not included as stand-alone elements, but were incorporated into the six other dimensions). These dimensions were chosen for three reasons. First, communities are the sum of their social and physical elements (Ziersch, 2011), and the six dimensions represent both social and physical components of a community. Second, all communities including their human and non-human members, have some way of operationalizing these dimensions. Politics, for example, can be operationalized formally through elected government, informally through inherited power, and in ecological communities through hierarchies. Finally, the eight dimensions were synthesized into six to help identify social-ecological interactions in a simplified and manageable way. Other dimensions such as participation, actors, health or history, can be added to the toolkit as communities see fit. Below, each dimension is described in relation to human, non-human, biotic and abiotic features.

Culture refers to a system of shared beliefs, values, customs, behaviours, and artifacts that members of a community use to cope with their world and with one another, and that are transmitted from generation to generation through learning (Beins, 2004). Human communities rely on and are affected by symbolic interpretations and representations of themselves as a cultural community, as these symbols ultimately guide how individuals interact with the biotic and abiotic elements of their environment (Bates & Tucker, 2010). Cultural resources are often derived from and require healthy ecosystems, such as uncontaminated land required for food production, sacred grounds, ceremonies or medicines (Burger et al., 2008). Furthermore, the traditions or behaviours (e.g. subsistence fishing) characterized by a particular community may create unique exposure pathways making them distinctly susceptible to particular environmental threats (Bolte et al., 2011).

The *economy* of a community refers to the management and use of the resources within its boundaries, especially in relation to its productivity. The economy of a

community accounts for employment, income and sustainable development. In a socio-ecological system, income inequalities, for example, may provide leverage for some community members to have greater control over natural resources (Pickett et al., 2001). Poverty within a community can lead to stress and anxiety, leaving some community members to resort to employment in environmentally contaminated or unsafe working environments (Blaxter, 2011), or accepting the construction of hazardous facilities in exchange for the job opportunities (Lubitow & Faber, 2011).

Community *politics* are the processes by which groups of individuals make decisions, usually in regards to governmental affairs. Of particular interest are the power dynamics at play within communities, which dictate transparency and participation in decision-making processes. Communities within communities with reduced political power, for example, may not have the resources or sway to oppose the siting of a hazardous waste site in their community (Bolte et al., 2011). Ineffective and inequitable law enforcement resulting in increased or unchecked crime can have negative health consequences such as isolation and deterrence from participating in outdoor activities and informal neighbourhood social exchanges (Schulz, 2011).

S*tructures* include the anthropogenic components of a community such as institutions, transportation services, water supply, sanitation/sewage systems, solid waste management and social services. Environmental justice inquiry may look specifically at access and proximity to community structures, as well as the accountability of institutions. Highways and freeways, for example, may be developed in closer proximity to communities of low socio-economic status (Schulz, 2011). Hazardous building materials may be used to construct public housing (London et al., 2011) and inadequate education and institutions may result in a lack of health knowledge (Blaxter, 2011).

The *environment* refers to all of the organic and inorganic elements that make up a community. Special interest is given to the quality of spaces and access to them. Communities located near landfill sites, for example, may be exposed to contaminated

soil (Bolte et al., 2011). Furthermore, access and exposure to nature can affect a variety of physical, mental and spiritual health outcomes (Wells & Donofrio, 2011).

A community, however, is more than its physical space and boundaries, and community members are more than just space sharers (Weaver-Hightower, 2008). Communities are also made up of *relationships*. Relationships exist between both human and non-human species and are characterized by the exchange of goods, services and information (Bates & Tucker, 2010). In the context of social-environmental justice, communities may be particularly interested in the formal and informal support networks that individuals or groups provide (Blaxter, 2011), the goods and services that ecosystems provide, and their capacity to adapt to changes in relationships.

Although these six dimensions of a community are not new, understanding them as they relate to ecosystems services in an environmental justice context transforms current inquiry into a more holistic endeavor. There are many social issues to think about in relation to these six dimensions, but if they are not understood from an ecological integrity perspective, it becomes challenging to make the case for ecological integrity in environmental justice from both practical and theoretical standpoints. Identifying the six dimensions foregrounds some of the ways in which healthy ecosystems contribute to the dimensions that define communities. These connections challenge communities to consider non-human elements as contributing members of a community.

The next step, then, is to integrate a social-ecological understanding of the unit of analysis into a new model and framework that integrates ecological integrity, social and environmental justice. The need for a new framework is especially relevant in light of growing evidence indicating that health disparities have recently been widening not only between north and south, but also within industrialized countries (in the United States, for example)" (Bolte et al., 2011, p. 459). As environmental justice advocates are "searching for systems wide□concepts and tools that are at the same time holistic, bottom-up, community-based, multi-issue, cross-cutting, interdependent, and unifying" (Lee, 2002), what is urgently needed in environmental justice inquiry is research that extends beyond

the *descriptive* domain and generates greater awareness and consciousness of the interconnectedness between humans and the ecosystems which support all forms of life. The purpose of this paper is to propose a simultaneously *prescriptive and responsive* model and toolkit for seeking and maintaining socially and ecologically just communities when environmentally unjust scenarios arise.

3.6 What is a Model?

Models are visual representations of objects, systems or processes (Taper et al., 2008). Often used as ways of integrating knowledge across many disciplines, models provide simplified representations of complex systems, their predicted relationships and potential stressors on the systems (Laniak et al., 2012; Nyhus et al., 2007). Models culminate key principles and common factors that support a particular concept, and can take various shapes (Grice, Arene & Marsh, 2009). Linear models illustrate a continuum of a process or system, for example, along a spectrum. Static models, such as Dolan and Ommer's (2008) social-ecological model of health (see Figure 3.1: Dolan and Ommer's social-ecological model for health, 2008) represent snapshots of variables in complex systems. Cyclical models (see Figure 3.2: Holling's adaptive cycle, 2001, and Figure 3.3: the International Institute of Sustainable Development's appreciative cycle, 2000) represent the interactive, dynamic and iterative recurrent relationships between variables.

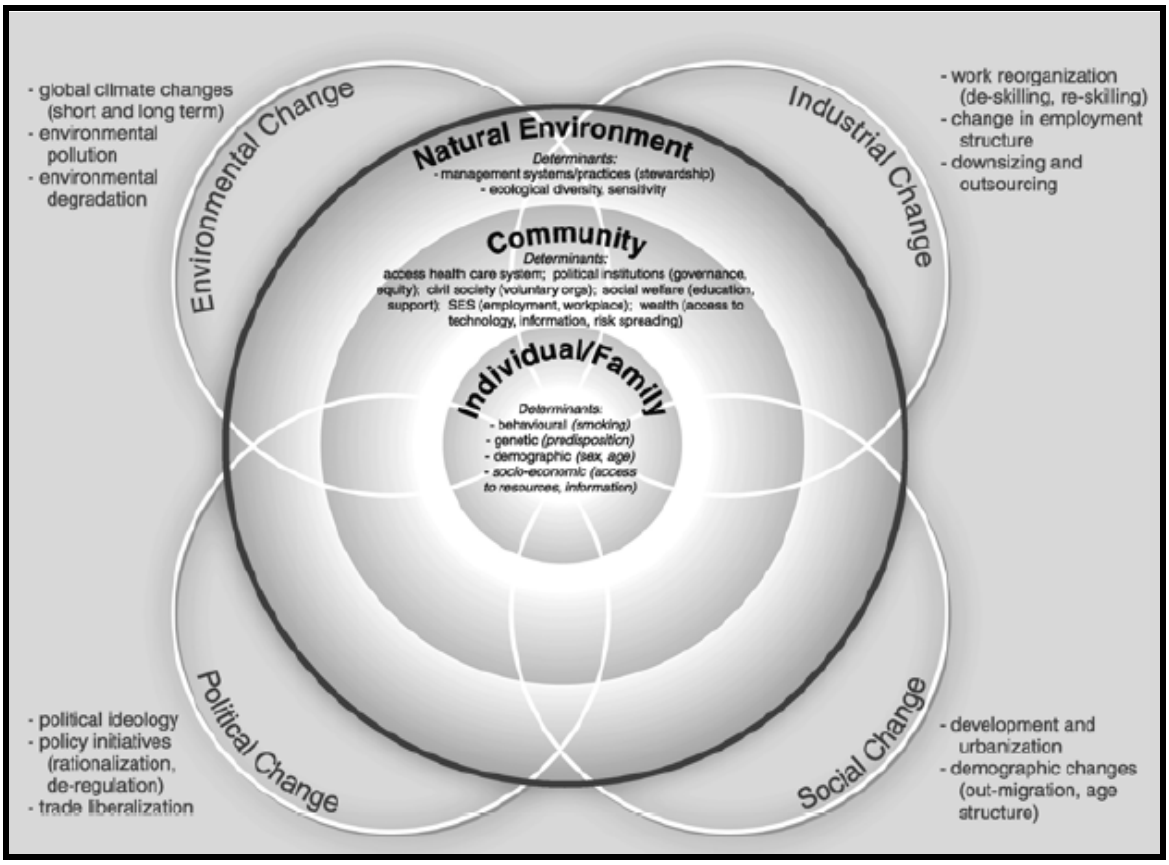

Figure 3.1: Dolan and Ommer's (2008) social-ecological model for health

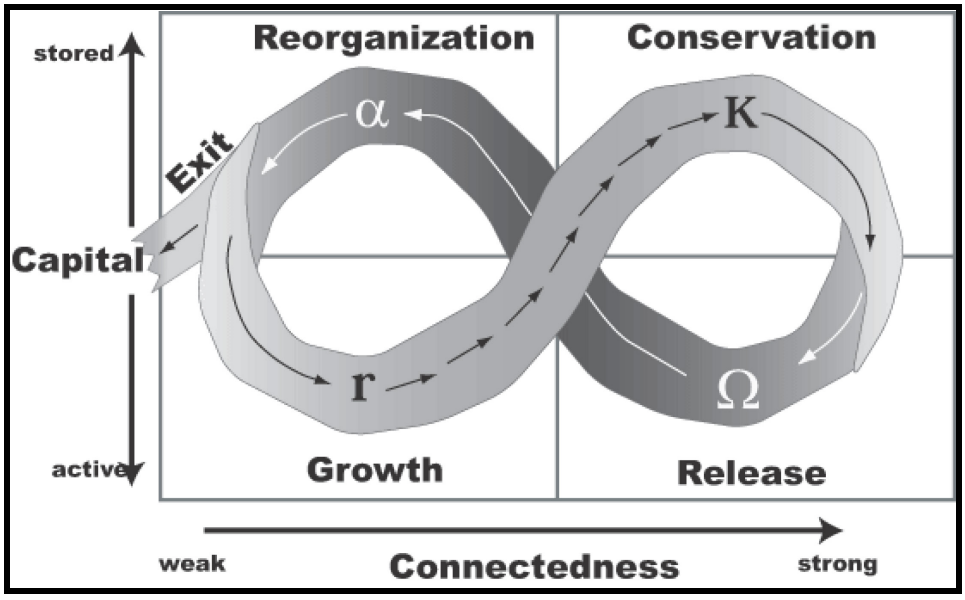

Figure 3.2: Holling's (2001) adaptive cycle model

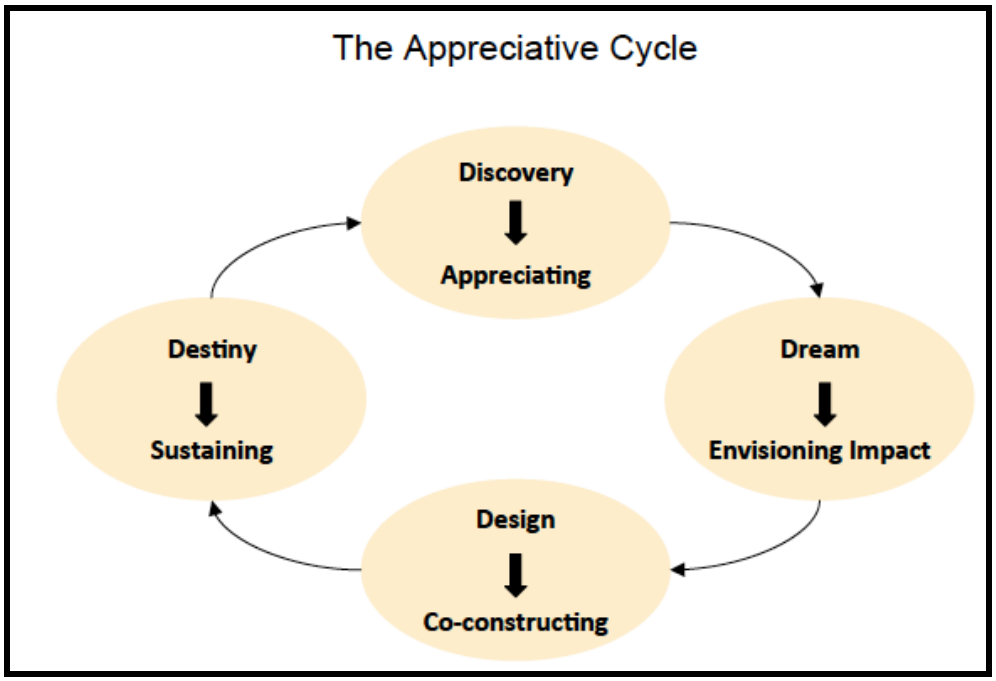

Figure 3.3: Adapted from the International Institute for Sustainable Development's (2000) appreciative inquiry model

Models can be used in two ways; retrospectively, to examine a transformation process in order to glean lessons from its successes or failures, and in real-time, to "increase awareness and proactive anticipation of potential levers or barriers of [a] system" (Peirson et al., 2011, p. 310). In a problem solving or decision-making context, a model is most importantly a blueprint or master plan of a process. By providing an illustrated path of direction, which guides exploration, a model has the ability to safeguard against "potentially misguided leaps of faith or kneejerk reactions, [allowing stakeholders to] proceed with stable confident steps" (Peirson et al., 2011, p. 319). Social-ecological systems are exceptionally complex, and models such as the one created by Dolan and Ommer help stakeholders to attend to a diverse spectrum of issues and positions that must be incorporated in problem solving and decision-making processes.

3.7 Getting to a Model for Ecological Integrity in Environmental Justice

Three key models informed the development of a new model for environmental justice: the Social-Ecological Model for Health, the Adaptive Cycle Model and the Appreciative Inquiry Model. Dolan and Ommer's (2008) Social-Ecological Model for Health builds upon existing climate change adaptation, community, and population health models by illuminating a multitude of determinants to human health. Individuals, families and communities are nested within the natural environment, and are in turn modified by environmental, industrial, societal and political changes. The model illustrates that anthropogenic changes to ecological services have consequences on human health both directly and indirectly (Dolan & Ommer, 2008). From this framework came the inspiration to create a nested Ecological Integrity for Environmental Justice (EIEJ) model, which illustrates that human and non-human species and ecosystems are interdependent (see Figure 3.4: The ecological integrity for environmental justice model). Presenting the EIEJ model in such a way allows actors using the toolkit to determine not only social determinants of health, but also environmental determinants of health.

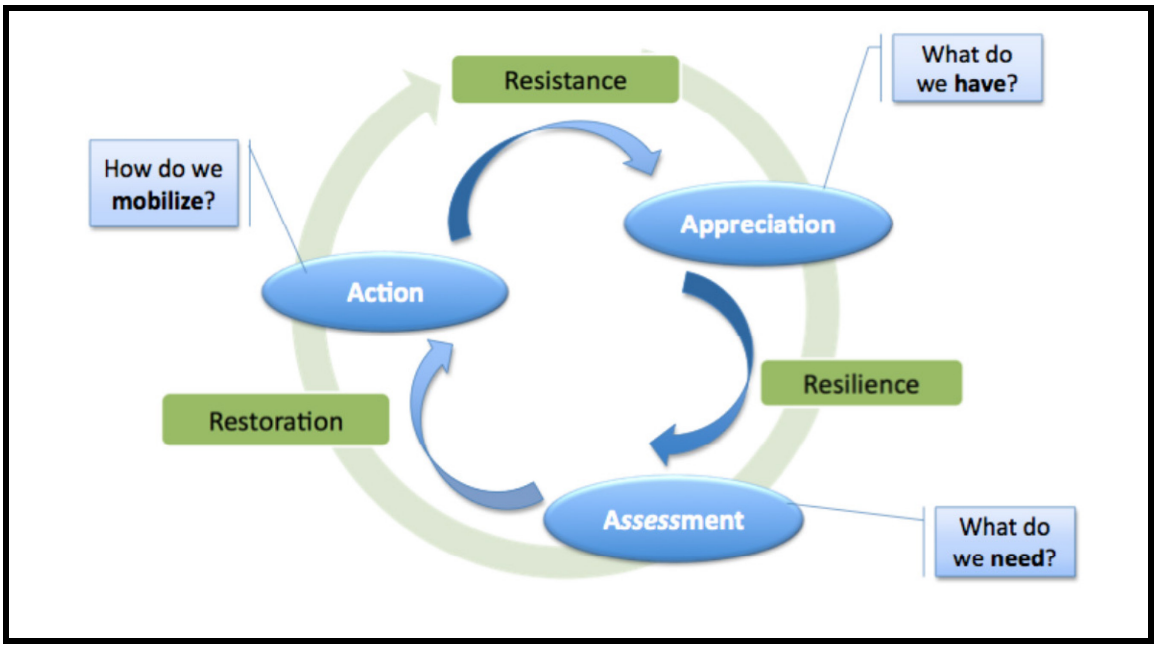

Figure 3.4: The ecological integrity for environmental justice model

Holling's (2001) Adaptive Cycle model is a simplified representation of system (both ecological and social) dynamics. Ecological, social or cultural capital slowly accumulate (r) to the point of stability and organization (K), at which point the system becomes increasingly susceptible to disturbance, collapses (omega) and enters a "creative destruction" phase where reorganization (*a*) leads to new growth (Holling, 2001). Holling's analogy between traditionally ecological concepts provided the inspiration to develop the social and ecologically parallel definitions of resistance, resilience and restoration in the EIEJ model. Linking these social and ecological concepts through common language highlights the related vulnerabilities and capacities that both social and ecological systems share. The adaptive cycle was also instrumental for determining the foundational concepts of the EIEJ model. Holling (2001) identifies three properties that shape the adaptive cycle: wealth, controllability and resilience. Wealth refers to the accumulation of capital; controllability to the degree to which a system can control its own destiny; and resilience to a system's adaptive capacity. The concept of resilience was chosen for the EIEJ model because it suggests system tenacity, a positive attribute. Wealth and controllability, on the other hand, cast a more competitive shadow on system dynamics, and imply that all components of a system are on a level playing field. The definition of environmental justice demonstrates that a variety of elements (e.g. socio-economic status or race) place certain individuals or communities in more vulnerable positions than others.

The International Institute for Sustainable Development's (2000) Appreciative Inquiry Model has four collaborative phases: discovery, dream, design and destiny. In the first phase, agents are motivated to identify the best of their communities, such as skills or victories. Next, they are encouraged to explore how they can heighten their potential and furthermore create a strategy to carry out this potential. Lastly, images for the future are delivered and new skills are discovered, which propel the cycle (International Institute for Sustainable Development, 2000).

Appreciative inquiry presents a method for working through problems by gathering knowledge on the existing strengths and local skills of a community, which in

turn can be harnessed to empower local actors to be their own agents of change (International Institute for Sustainable Development, 2000). The EIEJ draws on three main strengths of the Appreciative Inquiry model, the first being its cyclical format. Because no social-ecological system is static and continuous developments require that we constantly scrutinize our decisions and actions, the EIEJ model is also cyclical. It follows the same cycle of discovering "what we have", "what we need", and "how we mobilize", through the processes of appreciation, assessment and action, which are nested within the social and ecological processes of resistance, resilience and restoration. The second influential component of the Appreciative Inquiry model is the focus on capabilities rather than dysfunction. Similarly, the EIEJ model intertwines the concepts of appreciation, resistance and resilience to emphasize endowment in light of injustice. Finally, the EIEJ model, like the appreciative inquiry model, is designed to be highly participatory in order to empower stakeholders at grassroots levels to be their own agents of change.

3.8 An Ecological Integrity for Environmental Justice Model

A model for ecological integrity and environmental justice and a toolkit that can be used by a spectrum of actors across community, industrial, governmental and academic scales is put forward here. The purpose of the model is to integrate the social-ecological interpretation of a community into a visual blueprint for seeking and maintaining environmental justice. It illustrates that human processes are nested within ecological processes, and the toolkit provides a way to collect information to assess opportunities, challenges, and gaps within a system, from both human and non-human points of reference, to support decision-making and the restoration and maintenance of ecological integrity and environmental justice for all. If ecological integrity continues to be neglected in environmental justice inquiry, at stake is not only the health of humans, but also the health of the non-human species that share our global community (Parkes, 2011).

The EIEJ model merges the concepts of social-ecological interconnectedness, resilience and appreciation, pulled from the above existing models, but differs from them in three ways. First, no other model shares its focus with the interrelated concepts of social and environmental justice and ecological integrity. Second, the EIEJ model seeks to improve and cultivate not only human health outcomes and relationships, but also ecological health outcomes and social-ecological relationships. This is achieved in the analytical process by asking participants to think critically about their circumstances from both human and non-human perspectives. Third, the EIEJ model, because of its cyclical and iterative nature, encourages communities to return to the process (unlike the static models, which can be interpreted as single use frameworks and may not encourage stakeholders to consider accountability for future actions). Furthermore, the EIEJ model does not prescribe a single, definitive goal such as development, inclusion or capacity. Rather, the model is intended to provide users with a means to *restore and maintain* justice while encouraging communities to formulate their own individualized goals. The following section outlines in greater detail the foundation – resistance, resilience and restoration (see Table 3.1: Ecological integrity for environmental justice model concepts and definitions) – of the EIEJ model.

Table 3.1: Ecological integrity for environmental justice model concepts and definitions

Concept	**Definition**
Resistance	The capacity to resist, oppose or withstand disturbance.
Resilience	The capacity to adapt to a disturbance(s).
Restoration	The act of renewing, reviving or reestablishing.
Appreciation	The process of recognizing and giving value to assets of a community.
Assessment	The process of evaluating components of a community to determine any shortcomings.
Action	The process of identifying priorities, roles, resources, allies and benchmarks and designing a timeline.

3.8.1 Resistance

Resistance, for both human and non-human species (individuals and communities), is a concept vital for survival. From an ecosystems standpoint, resistance refers to the capacity of an ecosystem to "remain essentially unchanged despite the presence of disturbances" (Roy et. al, 2011, p. 1662). Ecosystem disturbances can be both biotic (e.g. predation or herbavory, competition with invasive species) and abiotic (e.g. change in temperature and soil composition) (Antonio & Thomsen, 2004), and can vary in frequency. An increase in human activities causing harm to the biosphere suggests that ecosystems will be faced with more intense and frequent disturbances (Millennium Ecosystem Assessment, 2005). Resistance is thus a necessary measure by which ecosystems are able to control the composition of their living community (Antonio & Thomsen, 2004). The capacity to tolerate the presence of chemical pollutants or the introduction of a non-native species without exhibiting significant change, are examples of ecosystem resistance. Literature in this field suggests that ecosystems with greater ecological integrity (i.e. ecosystems that are biodiverse and have key ecological attributes intact) will be more resistant to changing patterns and types of disturbance than those systems with less biodiversity (Unnasch et. al, 2009). Thus, proper ecosystem functioning is a necessary component for resistance and survival.

Like ecological systems, human systems can share similar characteristics of resistance. Human resistance, however, is more closely linked to the concepts of (social) place and power (Castleden et. al, 2009). The places in which people live, work and play have both spatial and social associations, making them "social spaces" (Creswell, 1996, pg. 3), which over the course of time have been (often through hegemony) named, mapped and measured (Sutton & Kemp, 2011), making them also spaces where power is actualized. Thus, resistance in a social context targets power, or more specifically, power imbalance. In environmental justice literature, affected communities are often referred to as being "communities of least resistance" (Buzzelli et al., 2003). On the contrary, many communities that have experienced adverse environmental disturbances have indeed mobilized for resistance (see, for example Edwards, 2011; Orta-Martinez & Finer, 2010).

Place, therefore, is both a "site for oppression and transformation" (Sutton & Kemp, 2011, pg. 3). Communities may resist a particular disturbance or power in an effort to gain capacity to make decisions (Castleden et. al, 2009), gain control over or access to cultural or environmental resources (Mittleman, 1998), or establish equity (Bullard, 1990). Resistance can occur every day on small, subtle scales, or can be orchestrated and organized on much larger scales to achieve more far-reaching goals (Sharp et al., 2000). Ultimately, both ecosystems and human systems, together as social-ecological systems (Berkes, Colding & Folke, 2003), use resistance as a means to persist.

3.8.2 Resilience

If the concept of resistance reflects the capacity of a system to oppose the penetration of a disturbance, resilience can be understood as the process and capacity of a system to adapt to disturbance (Masten, Best & Garmezy, 1990). Change is a keystone of ecological resilience, as environments are not static but are rather being continually (and recently more rapidly), confronted with disturbances, requiring adaptation and evolution (Chapin et al., 2009). Resilience has been described as the capacity for a system to absorb (Moritz et al., 2011) or sustain (Chapin et al., 2009) disturbance and subsequently remain (Cumming, 2011), persist, maintain (Moritz et al., 2011), recover or rebound (Gunderson, 2010). Ecosystem resilience refers to "the capacity of a social–ecological system to absorb a spectrum of shocks or perturbations and to sustain and develop its fundamental function, structure, identity, and feedbacks through either recovery or reorganization in a new context" (Chapin et al., 2009, p. 24). Ecosystems literature suggests that intact and diverse ecosystems tend to be more resilient (Pojar, 2010).

Human systems also have the capacity to be resilient when confronted with disturbance (see, for example, Nuwayhid et al., 2011). In contrast to a vulnerability perspective, which is primarily concerned with individual deficit, pathology and dysfunction (*who* is at *risk*), a resilience perspective focuses on strengths that people bring to bear in the promotion of health and restoration (Benard, 2010). Human resilience refers to the capacity to withstand or overcome adversity (van Wormer et al., 2011) at

either an individual or community level, through, for example, the pooling of resources, knowledge, social supports and capital (Reser & Swim, 2011). Reflective of the strengths, assets and unique culture of a community, resilience embraces people as resources, not problems, diversity as a strength, strategies that aim to restructure the relationships, beliefs, and participation within a system, empowerment, and connectedness over control (Benard, 2010, p. 65-66). Factors that can affect human community resilience, such as the built and natural environment, social capital, structural factors, and services and institutions, can similarly affect ecological resilience (Bernard, 2010). Thus, human and ecosystem resilience are interconnected, and can be exercised alongside one another.

3.8.3 Restoration

When a system – ecological, social, or social-ecological – suffers the effects of a biological disturbance to the point of detriment, restoration becomes a desired measure. Habitat loss or fragmentation, invasive species, climate change impacts, air and water pollution and overharvesting all put ecosystems at risk (Rapport et al., 1998; Thorpe & Stanley, 2011), and if pushed to their thresholds, require restoration. A wide range of terms including re-establishment, replication, rehabilitation, remediation and return, are all tied to the concept of restoration, but ultimately represent the same idea which is "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (Society for Ecological Restoration International Science & Policy Working Group, 2004). When attending to environmentally disturbed spaces, governmental bodies and industry will oftentimes offer 'cleanup' solutions (McCarthy, 2002). Cleanup initiatives can differ from restoration in that cleanup initiatives often have a set of standards appointed by regulating bodies, which may not take into account human or non-human community-specific factors such as dependence on resources for subsistence or the ceremonial use of certain plants and animals. Such oversights can lead to a downplaying of the reach and urgency of the cleanup (Hooks & Smith, 2004). Restoration outcomes should reflect not only the historical composition of ecological communities, but should also reflect the cultural value associated with ecosystems

(Burger et al., 2008). In Canada, restoration efforts aimed at re-establishing ecological integrity are supported by legislation such as the Canada National Parks Act and the Species at Risk Act (Parks Canada Agency, 2008).

In the human sense, restoration, often referred to as 'restorative justice' in social and environmental justice contexts, is a transformative and participatory process wherein transgressors – or those who have been responsible for the environmental damage – assume responsibility for their actions through conversation with all parties involved, often resulting in apology, forgiveness and healing (Choi et al., 2010; Moore & Mitchell, 2011; Wenzel et al., 2009). The restorative process may include such practices as healing circles, fact-sharing, victim offender mediation, acceptance of responsibility and group conferencing (Choi et al., 2010; Moore & Mitchell, 2011). Restoration is an alternative approach to conventional retributive action and can be particularly useful for environmental justice amelioration (see, for example, Goodman, 2012), as the resolution process requires safe space where experiences and views may be meaningfully expressed and heard in light of power relations.

The concept of restorative justice is deeply rooted in Indigenous epistemologies spanning back for millennia (Moore & Mitchell, 2011). Closely linked to restoration in many Indigenous epistemologies is the acknowledgement of the interdependency of healthy communities and ecosystems, and an obligation to maintain order in social-ecological systems (Burger et al., 2008). Such worldviews draw attention to the reciprocal benefits of both ecological and social restoration (Krasny & Tidball, 2009). Ecological restoration not only re-establishes and protects ecological integrity, but also restores cultural heritage and creates social benefits through the enlightenment, education and engagement of citizens, which may result in a greater appreciation for ecological integrity (Cairns & Palmer, 1995; Krasny & Tidball, 2009; Parks Canada Agency, 2008). The *process* of restoration is equally as important as its *outcomes*; such cycles provide the opportunity for individuals and communities to redefine their sense of place (Leigh, 2005).

Resistance, resilience and restoration formulate the foundation of the EIEJ model. The terms as they are described in this paper support the definition of a social-ecological community; they merge traditionally siloed concepts into transdisciplinary ones, an exercise which dissolves human/nature dichotomy. The next step, however, is to provide a way in which actors can operationalize these concepts to restore and maintain social-ecological justice. A toolkit provides the forum for such operationalization.

3.9 An Ecological Integrity for Environmental Justice Toolkit

The cycle of appreciation, assessment and action represented in the EIEJ model provides a blueprint for the process of maintaining ecological integrity alongside environmental justice. Models, however, are only visual representations of systems, and therefore, do not necessarily trigger practical engagement. To avert the risk of remaining idle, the EIEJ model has been supplemented with a toolkit. The participatory toolkit transforms the abovementioned concepts into applied action. The purpose of the EIEJ Toolkit is to facilitate the processes of the model through oral dialogue and written observation. The EIEJ Toolkit is essentially a workbook that contains a series of open-ended and scale-response questions designed to generate discussion on and prioritize elements of the social justice and ecological integrity of a community.

3.9.1 What is a Tool?

A tool provides a way to collect information to support decisions and as such, transforms the cognitive (model) into discourse and action-oriented processes (Kaartinen & Kumpulainen, 2002); it should be compatible with the data it is seeking to collect and should be easy to use and understand (Global Bioenergy Partnership, 2010). Thus, a tool created to collect field-level knowledge of health and environmental changes in a given community should be presented in the appropriate non-scientific language and should credit empirically-derived community knowledge as being valid (Tesh & Williams, 1996). Tools prompt stakeholders to provide particular and desired knowledge. Where models *represent* a concept, system or process, tools are *applied* to collect and synthesize

information in order to assess opportunities, strains and gaps within a system (National Collaborating Centre for Methods and Tools, 2012), establish rapport, actualize transparency and begin to build trust and consensus around the problem to be solved. Two examples of toolkits that incorporate these elements are the Workbook for Looking at Social and Economic Exclusion (Shookner, 2002) and the Community Capacity Building Tool (MacLellan et al., 2007). Both present effective elements that have incorporated into the EIEJ Toolkit.

While there are many toolkits available for collecting information to help find solutions to problems, the EIEJ toolkit was modeled from the Shookner (2002) and MacLellan et al. (2007) toolkits for three reasons. First, both toolkits acknowledge participation as a grassroots, bottom-up process. This is important for community research as the solutions provided by the toolkit reflect community visions. Second, Shookner (2002) does not simply pose questions to stakeholders – he frames them in relation to dimensions of exclusion and a values foundation. Framing questions in such a way provides a common ground from which to gauge answers to questions. The value of ecosystems as a determinant to human and non-human health provides consensus on a point of departure from which communities can establish goals to achieve. Finally, the focus on capacity in the MacLellan et al. (2007) toolkit shifts the problem-solving process from merely identifying problems to identifying solutions to problems based on community resources. This self-awareness is important for the problem-solving process because it keeps solutions within reach of community.

Knowledge is shared among groups of individuals occupying a particular space (Stretesky et al., 2011), and continual stakeholder knowledge exchange makes a shared vision for solutions to environmental injustices in a community feasible (Fisher, Ury & Patton, 1991). The purpose of the toolkit, therefore, is to stimulate dialogue on a shared vision of a healthy community. The objectives of the toolkit are to generate appreciation, make links across the social and ecological components of a system, document changes in community health and prioritize community needs. The objectives are exercised in three phases: appreciation, assessment and action. Shookner's (2002) Workbook for

Looking at Social and Economic Exclusion (2002) provides a unique way to examine a variety of programs and practices to determine not only if they are socially and economically inclusive, but also to help uncover some of the root causes of discrimination (Shookner, 2002). The Community Capacity Building Tool (MacLellan et al., 2007) provides communities with a means to assess their current capacity in relation to, for example, participation, leadership and skills. The EIEJ Toolkit draws on the layout that Shookner provides for the Workbook for Looking at Social and Economic Exclusion. Included in the EIEJ Toolkit are a values foundation and compositional elements of a community (Shookner provides elements of exclusion). The scaled-response questions in the toolkit allow answers to be plotted on a justice maintenance matrix, a method borrowed from the Community Capacity Building Tool.

3.9.2 Appreciation

The first objective of the toolkit is to realize the *strengths* and the ecological *value* of communities through knowledge and experience sharing. Environmental justice researchers have been successful in demonstrating and quantifying the severity and distribution of environmental hazards (Masuda et al., 2010). Moving away from problem-centered approaches and a language and lens of deficiency, the process of appreciation makes the assets of a community the focal point of discussion (Cooperrider & Srivastva, 1987). The first phase of the model and toolkit asks stakeholders to consider *'what we have'*. This appreciative phase borrows from the strengths of the appreciative cycle, and is enhanced by encouraging stakeholders to consider their communities beyond their human dimensions. Through the exercise of answering a series of open-ended questions relating to the features of a community, stakeholders are able to glean from their answers *local* skills, strengths and assets. The strengths, assets and skills uncovered in the appreciative phase can be referenced further on in the action stage of the cycle.

Highlighting the positive characteristics and strengths of individuals and communities can be useful for cultivating pride, social capacity, respect and best practices (McAdam & Mirza, 2009; San Martin & Calabrese, 2011). However, in order to

identify or 'spot' individual or community abilities, communication and knowledge exchange must occur, requiring that the appreciative process be collective, collaborative and participatory (McAdam & Mirza, 2009). Through this collaborative, knowledge sharing process, communities generate optimism and begin to conceptualize their cultural identity and vision of a healthy environment. Developing a collective vision for healthy environments and people provides a benchmark for a shared understanding about how to better evaluate and address inequalities (Stretesky et al., 2011). Moreover, because the EIEJ model uniquely requires stakeholders to consider non-human entities as members of a community, ecological citizenship begins to materialize and environmental consciousness is heightened. These feelings of belonging to an ecological community and heightened consciousness, in turn, help communities to realize ecological integrity (Wolf, Brown, & Conway, 2009).

3.9.3 Assessment

The second and third objectives of the toolkit are to help communities discover and/or characterize *links* between human and ecosystem health and to systematically *document* the history and experiences of human and non-human species in a health context over time. Holling's (2001) adaptive cycle represents how social-ecological systems grow, collapse and re-organize. The assessment stage aids stakeholders in identifying their position in the adaptive cycle. This is achieved through an evaluation of surroundings by way of guided consultation. Guided consultation provides community members the opportunity to make links to other members of the community, both human and non-human, who have also experienced changes to quality of life. The assessment phase is intended to draw out the critical needs for both human and non-human health. Over the course of the guided consultation, a list of disturbances (environmental injustices) for a particular community is generated. This collective list not only helps to legitimize these needs because of the process of systematic documentation, but also provides a mutually agreed upon point of reference from which to initiate action.

3.7.4 Action

The fourth objective of the toolkit is to systematically *prioritize* stakeholder or community needs at multiple scales from the individual to the collective. Collaboration on the part of many stakeholders is often at the heart of community activism (Heath, 2010), and this action can be generated at political, local, collective or individual levels. Socio-environmental justice issues are complex problems, and the toolkit responses highlight the elements in socio-ecological systems that warrant the most attention. In order to do this, stakeholders are required to synthesize the information gathered over the course of the cycle in order to generate strategies to help mobilize for environmental justice. The first task for stakeholders is to plot responses from the assessment phase on an environmental justice matrix. This matrix provides a visual conceptualization of 1) healthy community features and relationships and, 2) disturbances in community features and relationships. Being that the model follows the cyclical pattern of both the appreciative and adaptive cycles, the matrix also ultimately reveals progress (or lack thereof) in community features and relationships, as the same questions will be asked in subsequent cycles.

After plotting responses, stakeholders are encouraged to reflect on and draw from the skills, assets and strengths that were identified in the appreciation phase. The information discovered in the previous phase provides a starting point from which to distinguish roles, resources, allies, benchmarks and timelines for mobilization. A timeline, to be created as the final action item, is intended to help maintain the momentum of the process by encouraging participants to return to the model and toolkit by adhering to "check-in" dates. Throughout the entire model process, communities will continually discover and create new strengths and roles, and may discover new disturbances, which in turn will renew the cycle. This appreciative style of transformation has been "validated in a number of experiments in psychology, teaching, sports coaching, organizational development and many other fields" (McAdam & Mirza, 2009, pg. 183), which suggests it has potential for success in environmental justice inquiry.

As communities cultivate shared visions and identify tools to be harnessed to construct, re-construct and nurture healthy environments, capabilities become cherished and may ultimately influence the way individuals behave. The onus to act in a just manner, however, ought not to rest solely on the shoulders of those experiencing injustice. Because the transformative cycle is a "public statement of…different role[s] with changing responsibilities" (McAdam & Mirza, 2009, pg. 187), active participation on behalf of a variety of stakeholders in the cycle is necessary for genuinely shared responsibility.

The EIEJ model transcends rigid temporal, spatial and conceptual boundaries and therefore, the toolkit can be used at any juncture of an environmental disturbance. It has been created so that it is accessible to individuals and communities outside of academia, parliament, or the laboratory and therefore, will likely be put to use first by small groups of concerned citizens confronted with an environmental injustice. Through each iteration of the cycle, participants will identify additional stakeholders who ought to be included in the dialogue. This process will continue to ultimately generate evermore expanding networks. After stakeholders have engaged in meaningful consultation in regards to a particular socio-ecological problem, they are encouraged to return to the toolkit on a regular (e.g. annual) basis to ensure that justice and integrity are being maintained.

The EIEJ Toolkit can be used by community groups, non-governmental organizations, academics, public and private industry and the government. To encourage meaningful and equitable engagement of all parties involved in the process, stakeholders must first "contend with a broader and more nuanced understanding of power" (Woolford & Ratner, 2010, p. 9). Power imbalances are best kept in check when stakeholders are mindful of who speaks, aware of who is respected when they speak, who is spoken to, who controls information and are cognizant of what information is considered to be trustworthy or legitimate (Innes & Booher, 2004). In such a collaborative, participatory process, stakeholders have the opportunity to question data as well as present their own (Innes & Booher, 2004). For the collaborative process to be most effective, participants should come to the discussion ready to use creative strategies to work towards

transformative justice (Woolford & Ratner, 2010). This requires an openness and willingness to engage in unconventional problem-solving techniques.

3.10 Conclusion

There are a great number of factors, both social and ecological, that affect the well-being – the sense of security, basic necessities, freedom of choice, health and healthy relationships – of both human and non-human species (Proenca & Pereira, 2011). Environmental justice theory has typically underplayed the role of ecological integrity in understanding health inequalities, (Neimanis et al., 2012) and signals a history of fragmentation between humans and the environments in which we live. Unprecedented changes to ecosystems in the past 50 years caused by human activities (Chapin et al., 2009) coupled with a call to remedy the environmental crisis using a diverse gamut of interventions, solutions, visions and methods (Lubitow & Faber, 2011) have created conditions acutely relevant for the creation and application of the EIEJ Model and Toolkit.

In contrast to a body of environmental justice literature, which appears to address ecosystem health as an afterthought (at best), the EIEJ model broadens an environmental justice framework to incorporate ecological integrity as more than description. The EIEJ alternative approach to environmental justice inquiry uses both human and non-human perspectives as points of reference for approaching complex social-ecological problems. It is intended to promote democratic participation by being accessible and oriented towards equitable community dialogue and provides a venue for the systematic documentation of experiential knowledge serving not only to validate such knowledge but also to chronicle social-ecological changes within communities. Furthermore, the toolkit seeks to raise consciousness about the links between social and ecological maladies. With greater awareness of the reciprocal relationship between human and non-human systems, the process of maintaining ecological integrity alongside environmental justice as proposed in this paper provides above all, a *preventative* environmental justice

framework, which has the potential to eliminate environmental threats to particular communities before they even occur.

3.11 References

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CHAPTER 4: CONCLUSION

4.1 Introduction

Once a primarily American-centered movement, environmental justice research now documents the unequal and persistent environmental burdens experienced by populations worldwide (London, Joshi, Cairncross, & Claudio, 2011). Ecosystems research has simultaneously documented widespread environmental degradation that, on the current trajectory, suggests inevitable decline in ecosystem resilience and the vital services they provide (Adger, 2000). On one hand, environmental justice critiques are increasingly pointing out the role environmental justice should play in sustainable development agendas (Agyman & Evans, 2004), while on the other, few of the many policies which have been implemented to protect the environment recognize the importance of framing such issues in the context of social justice and equity (Agyeman, Bullard, & Evans, 2002). Wherever environmental degradation is occurring, it is almost always linked to issues of social justice, equity rights and quality of life in the widest sense (Agyeman et al., 2002). While the link between human and ecosystem health has never been more clear (Lubitow & Faber, 2011), discourses on human and ecosystem health have developed in parallel and therefore, are slow to intersect to create sufficient frameworks for addressing complex social-ecological problems (Agyeman et al., 2002; Agyeman & Evans, 2004).

Environmental injustices are complex problems and require an assortment of solutions, visions and methods (Lubitow & Faber, 2011). This thesis identified a shortcoming with respect to environmental justice definitions – a lack of acknowledgement of ecosystem services as a determinant to health - and then proposed a new model and toolkit for environmental justice. The new environmental justice model merged environmental determinants with social determinants of human and non-human health by introducing the concept of ecological integrity. Specifically, three objectives were fulfilled. First, I identified how environmental justice is defined, second, I created a model that merges the concept of ecological integrity into a new environmental justice

framework. Third, I created a tool that communities can use to facilitate the process of restoring and maintaining environmental justice.

To achieve my first objective, I conducted a systematic review of the literature on environmental justice. After four rounds of inclusion criteria, I retrieved 104 articles from four databases, which I then examined for thematic significance. The review revealed the epistemological perspectives from which environmental justice is conveyed, how the concept is operationalized across these paradigms, and most significantly, the general absence of ecological integrity from definitions (Neimanis, Castleden, & Rainham, 2012).

The results of the systematic review helped to substantiate the impetus for the second objective of this study, which was to re-conceptualize an environmental justice framework to incorporate the concept of ecological integrity. This objective was achieved through the process of theory-building. Through the theory-building phases of conceptual development, operationalization, (dis)confirmation, and continuous refinement and development, I created a new model for understanding environmental justice scenarios with an ecological integrity lens.

The third objective of this study was to create a toolkit that communities can use to facilitate the process of examining, restoring, and maintaining environmental justice. Two existing participatory toolkits were used as templates, and the literature that was gathered and analyzed for the model was translated into an environmental justice specific toolkit.

4.2 Key Findings and Recommendations

Four key findings emerged from the research for this study. Although the re-conceptualized environmental justice framework presented in this thesis provides a new avenue for approaching environmental justice, a recommendation associated with each key finding is made here to help enhance the environmental justice process and provide

areas for future research (see Table 4.1: Key findings and their associated recommendations).

Table 4.1: Key findings and their associated recommendations

Key Finding	**Recommendation**
Environmental justice discourses are largely anthropocentric.	Embrace the complexity of social-ecological systems and the environment as a determinant of human and non-human health.
Environmental justice discourses are fragmented and need to be integrated.	Encourage a transdisciplinary approach to seeking and maintaining environmental justice.
Approaches for ameliorating environmental injustice are reactive.	Create grassroots strategies to monitor ecological indicators.
Environmental injustice requires participatory solutions.	Embrace all types of knowledge (experiential, Indigenous etc.) to strengthen links between science and policy.

Each finding and its associated recommendation is discussed in greater detail below.

Finding 1: Environmental justice discourses are largely anthropocentric.

This study found that environmental justice discourse is human-centered in three ways. First, definitions of environmental justice are often supported by a language of human ethics (Pezzullo & Sandler, 2007), and people are often the subjects of definitions (see the United States Environmental Protection Agency definition for an example). Health, for example, is often framed in relation to human characteristics (i.e. physical, mental and social well-being), while the environment is defined as a place where *humans* live work and play (Lubitow & Faber, 2011). Second, beyond this definitional anthropocentrism is the way in which environmental justice scholars perceive and construct criteria for determining vulnerable populations. Results of my systematic review support earlier research (e.g. DeLuca, 2007) that the study of the inequitable effects of environmental

exposures is largely limited to human beings. Analysis of the 104 articles revealed that not one definition included in the systematic review gave an example of a non-human species as being vulnerable. Third, communities, which are the unit of analysis in environmental justice inquiry, appeared to be defined exclusive of their non-human counterparts. As such, the following recommendation is made:

> ***Embrace the complexity of social-ecological systems and the environment as a determinant of human and non-human health.***

Although complex problems, such as those that characterize environmental injustice, are not static as allegiances shift with changing social climes, humans do not operate apart from ecosystems (Bolte, Pauli, & Hornberg, 2011). There are a number of interconnected relationships in a social-ecological system that, when examined individually, do not exhibit the same properties as when understood as a whole (Atun, 2012). Recognizing the environment as a determinant of the health of human and other non-human species links ecological processes to social ones to create a complex, social-ecological system that shifts the sole focus of environmental justice away from humans to include non-human species. This is done here by highlighting what others have found (e.g. Brule & Pellow, 2006): that there is an association between the exploitation and degradation of the environment and of human populations, by presenting examples of how communities are modified by and modify ecosystems, and as such, are active members of a community, and by providing a space in the reconciliation process for non-human points of reference and needs. The anthropocentric frame of environmental justice overlooks ecosystem services and their proper functioning as vital for the survival of all species on earth. It could take many years for environmental justice proponents to internalize the value of the environment as a determinant to health in the dominant, anthropocentric paradigm, and therefore, it is recommended that albeit complex, social-ecological centered frameworks, such as the one presented in this study, be put forward without delay.

Finding 2: Environmental justice discourses are fragmented and need to be integrated.

The systematic review subject search in this study retrieved over 2000 articles on environmental justice in a ten-year period alone (the EPA policy came into being six years earlier and was premised on roughly ten years of prior engagement with the idea of environmental justice). The large volume of articles published on the topic contain a diverse collection of conceptual and operational definitions. Furthermore, articles were written from a spectrum of epistemological perspectives and there is little consensus on the purpose of environmental justice. It has been presented, for example, as a grassroots movement, a policy principle, and a line of scholarly inquiry (Agyeman & Evans, 2004; Masuda, 2008). Models that are useful for understanding complex problems, such as Dolan and Ommer's (2008) Social-Ecological Model for Health (which represents quite successfully the interconnection between humans, ecosystems and health), were scarcely referenced in the environmental justice literature surveyed for this study. Literature that provides methods for improving human *and* ecological health outcomes rarely crosses over to the environmental justice domain. This is problematic as social-ecological problems are multicausal and thus, require insight from multiple disciplines (Belsky, 2002). As such, the following recommendation is made:

Encourage a transdisciplinary approach to seeking and maintaining environmental justice.

The fragmentation of complex problems and environmental justice scholarship more specifically, has resulted in a few approaches to the topic that are multidisciplinary (drawing on multiple disciplines but keeping them segregated) or interdisciplinary (synthesizing links across disciplines) at best (Lee, 2002; Nyhus et al., 2007). While multidisciplinarity and interdisciplinarity certainly improve environmental justice discourse, they do not do enough (especially the former more than the latter) to overcome the perennial challenge of the human/nature divide (Davidson-Hunt & Berkes, 2003; Grun, 2005). Thus, what is ultimately needed is a transdisciplinary approach for

environmental justice. Transdisciplinarity integrates elements across disciplines to create a new, holistic discipline (Hirsch Hadron, Bradley, Pohl, Rist, & Wiesmann, 2006). Such an undertaking is challenging, and may even require the creation of new language to communicate newly discovered relationships (Grun, 2005). Although challenging, a transdisciplinary approach is necessary to fundamentally shift perspective away from compartmentalization and embrace the wholeness of human and natural systems. This interconnection and wholeness has been observed by Indigenous peoples for millennia (Snively & Corsiglia, 2001), and as such, Indigenous scholarship may provide useful perspectives for transdisciplinarity.

Finding 3: Approaches for ameliorating environmental injustice are reactive.

Environmental justice researchers have been successful in demonstrating and quantifying the severity and distribution of environmental injustices after they had occurred (Masuda et al., 2010). The systematic review also concluded that distributive justice - the 'fair-share' principle that environmental burdens and benefits should be shared equally across societies regardless of ethnicity or class (Vaughan, 1995) - is the second-most emergent theme of the articles reviewed. Distributive justice evaluations in an environmental justice context are problematic because they are reactive. Such approaches often overlook or underplay the systemic causes of unequal environmental hazard distribution (Walker, 2009). This study, therefore, proposed a model for environmental justice that examines development proposals and their associated benefits and risks before they are manifested. As such, the following recommendation is presented:

Create grassroots strategies to monitor ecological indicators.

The descriptive and reactive history of environmental justice research has not been overly successful at identifying all root causes of injustice, or even preventing them. Even Robert Bullard (1993), a leading environmental justice scholar and activist, called attention to this failure by stating nearly two decades ago that what is needed in the environmental justice domain is a "public health model of prevention that eliminates the

threat before harm occurs" (p. 203). In order to prevent injustice, we must understand where it starts. Scholars make links between development decisions and resulting injustices, but often overlook a key feature in the process – the ways in which ecological integrity in compromised. By identifying these compromises, one can make a direct link between the cause and effect of injustice. As such, it is recommended that systems be developed for communities at grassroots levels to readily monitor ecological indicators or compromises to integrity. Such systems can include easy-to-use scientific recording devices, or observational systems that acknowledge and validate first-hand experiences. The goal then, is for stakeholders to become familiar with identifying compromises to integrity, and in doing so, begin to recognize patterns in cause and effect that will help communities to adapt to disruptions, or prevent certain actions occurring in the first place.

Finding 4: Environmental injustice requires participatory solutions.

Analysis of the 104 articles included in the systematic review for this study revealed that community-based researchers using participatory methods are the primary contributors to environmental justice scholarship (Neimanis et al., 2012). Acknowledging structural inequalities and power imbalances between researchers and communities, community-based participatory research is a shared, bi-directional, co-learning, co-created and mutually beneficial process with a goal of positive social change (Castleden, Sloan Morgan, & Lamb, 2012). Empowerment at the grassroots level requires communities to be their own agents of change. To carry out research most effectively, the tools that community-based researchers use should: 1) be compatible with the field-level knowledge they are seeking to collect, 2) be developed in the non-scientific language, and 3) credit empirically-derived knowledge (Tesh & Williams, 1996). As such, the following recommendation is made:

Embrace all types of knowledge (experiential, Indigenous etc.) to strengthen links between science and policy.

One might expect that, with thousands of articles written on environmental justice, there would be enough evidence to support environmental justice policy worldwide. The United States, however, is the only country with explicit environmental justice legislation. There is clearly a disconnect somewhere between what vulnerable populations experience and require, the information that is reported, and dialogue between those reporting on environmental justice and those who have the power to create policy. In order to strengthen environmental injustice evidence, greater validity ought to be given to alternative types of knowledge, such as experiential and Indigenous knowledge. It is the individuals at grassroots levels experiencing adversity who bear the burden of proof and who often do not have the resources or expertise to create scientifically technical reports, or communicate to policy-makers (London et al., 2011; Wang & Burris, 1997). Acknowledging these experiences and observations as being valid forms of knowledge: 1) shows respect and sensitivity towards those who experience environmental injustices, 2) provides more sources of information for the real-time changes in ecosystems at ground-level, and 3) creates an evidence base for implementing policy (Lee, 2002; Tesh & Williams, 1996).

While these key findings and recommendations suggest areas for further research, the most obvious area for further research would be to pilot test the EIEJ Model and Toolkit with an existing case of environmental injustice. The application of the model and toolkit will help to either substantiate its efficacy, or provide relevant insight on how to refine and improve the model and toolkit. While applying the new framework to an actual case of environmental injustice is beyond the scope of this thesis, a composite sketch of an environmental injustice scenario is presented, which highlights the overarching ways in which the EIEJ approach can have an alternative impact on human and non-human health outcomes that the existing, anthropocentric approach may overlook.

4.3. Applying the Model and the Toolkit: Revisiting Driftwood First Nation

Twenty-five years after the steel mill was constructed on Otter River upstream from Driftwood First Nation, both human and non-human members of the community

have suffered. Illness, disease and death, loss of habitat, biodiversity and subsistence goods, and the disruption of natural cycles and traditional activities have all plagued the territory. How can environmental justice inquiry investigate the potential health outcomes of developments, and do so in a way that recognizes and respects non-human entities as part of a community? Applying the Ecological Integrity for Environmental Justice model and toolkit is one way to respond to this challenge.

Putting the EIEJ Model and Toolkit to use at the time of the steel mill proposal may have provided a different trajectory for Driftwood First Nation. The collaborative and highly participatory framework would ensure that not only the perspectives of residents, leaders, planners, public health officials, scientists and educators would be represented, but also that the position of non-human species would be represented. The appreciation phase would highlight assets of the territory, including the resources that have allowed peoples to subsist in the area for thousands of years, the natural services which keep the local landscape clean, the wisdom of elders passed on through generations, and a system of governance that values respect for human and non-human entities.

It is possible that developments in environmental justice contexts proceed as planned, or proceed in accordance with a revised development plan that reflects negotiation among stakeholders. As the EIEJ model is cyclical, stakeholders would be encouraged or even required (if federal policy were implemented), to return to the toolkit at regular intervals. In the case of Driftwood First Nation, only a few years would have to pass before links could be made in regards to human and ecosystem health outcomes resulting from development. The assessment phase would highlight, for example, changes in attitudes, respect, decision-making capacity, access to traditional resources, biodiversity and stability. All of these changes would be systematically documented, creating an audit trail that can be used to help validate claims made by stakeholders in the community. The action phase of the EIEJ process would prioritize the needs of human and non-human members Driftwood First Nation to ensure that at some level, something is always done to help restore ecological integrity alongside environmental justice.

Application of the EIEJ Model and Toolkit to the steel mill proposal in Driftwood First Nation would likely generate greater awareness and consciousness of the interconnectedness between humans and the ecosystems that support all forms of life among all stakeholders. Health outcomes for all human and non-human members of the territory would have been regularly monitored, and consultation would have provided a common ground from which to approach complex issues. Most importantly, the EIEJ method differs from popular anthropocentric models for environmental justice in that it requires human and non-human points of reference for addressing problems. The result is a re-conceptualized framework which integrates the importance of ecological integrity and in return, improves health outcome for both humans and non-human entities in scenarios of potential environmental injustice.

4.4 Study Limitations

The limitations for this study can be broadly divided into those that pertain to the systematic review, and those that pertain to the model and toolkit. The one, overarching limitation, which had an impact on both objectives, was that of time. More time could allow for a broader analysis of environmental justice literature, and greater opportunity to (dis)confirm the robustness of the model and toolkit and generate outcome (explanative/predictive) knowledge and process knowledge (how something works) (Lynham, 2002). That being said, the observations made in this study are useful in that they paint a general picture of how environmental justice *is* and *should be* conceptualized.

The major limitation of the systematic review was the necessity to restrict article retrieval results through a title search. Although it was a necessary action to confine the study and ensure consistency with search results, limiting the review to a title search of "environmental justice" created a narrow scope in which other (and perhaps similar) frameworks were excluded. Ecojustice, ecospirit, and ecohealth, for example, are all frameworks that have both environmental and social justice goals, yet were excluded from the review as they have distinguished themselves (definitionally and linguistically)

from the environmental justice domain (see, for example, Bowers, 2001; Kearns & Keller, 2007; Lebel, 2003). There is merit, however, in restricting the review to a title search of environmental justice, as this is a well-established and more importantly, an applied framework (in the US).

The most significant limitation to the theory-building process in this study is the absence of empirical application. When new theories or models are created, they are often tested on the phenomenon that they are seeking to clarify (Wacker, 1998). This is the practical element of the theory-building process, and the purpose of application is to provide real-world experience that will help to inform, further develop and refine the theory (Lynham, 2002). While the application of the EIEJ model and toolkit was beyond the scope of this thesis, the composite sketch illustrated in the introduction and conclusion of this thesis provides insight into how the model and toolkit *could* influence health outcomes for both human and non-human species in an environmental justice context. Most importantly, the creation of a model and toolkit has provided the groundwork for subsequent research.

4.5 Research Contributions and Implications

The research and conclusions drawn from this thesis provide both substantive and theoretical contributions. The substantive contributions are the real, empirical conclusions derived from the systematic review, while the theoretical contributions are those hypothetical conclusions (presented as the model and toolkit) generated through theory-building and validated with literature.

4.5.1 Substantive Contributions

The results of the systematic review provide the substantive contributions of this thesis. Primarily, and most significantly, the systematic review communicates that the notion of ecological integrity is generally absent in definitions of environmental justice (Neimanis et al., 2012). This discovery should be interpreted as a vulnerability in current conceptualizations of the environmental justice framework. It signifies that, although

connections continue to be made between the health of ecosystems and the health of human and other non-human species (Rapport & Singh, 2006), such connections have yet to permeate environmental justice scholarship. Without this recognition, environmental justice inquiry cannot comprehensively maximize health outcomes for both human and non-human species.

This contribution to environmental justice scholarship has implications that relate specifically to policy. Currently, as previously mentioned, the United States has a policy to ensure that environmental justice is incorporated into agency operations (although its efficacy is continually called into question (see, for example, Holifield, 2009; Walker, 2009)). In Canada, however, "environmental justice as a concept does not appear explicitly in policies of the federal government" (Mitchell, 2004, p. 559-560). Yet it is stated in the Canadian Environmental Protection Act (1999) that "the protection of the environment is essential to the well-being of Canadians" (Environment Canada, 2007, para. 2). The absence of environmental justice policy in Canada, coupled with the Canadian Environmental Protection Act declaration, point to the need for environmental justice policy creation. Existing policy models (e.g. the USEPA) as well as substantive scholarly literature have the capacity to influence policy development, but the absence of ecological integrity in the literature implies that the concept will be overlooked in policy formulation. This study specifically acknowledges and addresses this gap in the literature and in return, has the capacity to influence environmental justice policy creation.

4.5.2 Theoretical Contributions

The primary theoretical contribution that this thesis provides is a new conceptualization of the environmental justice process. Through the introduction of ecological integrity as an important determinant to human and non-human health and well-being, the EIEJ Model and Toolkit contribute a reconceptualized approach to environmental justice that seeks to highlight related maladies and capabilities of human and non-human systems. The model specifically provides a point of convergence for terms and processes that have traditionally been appointed to either biological or human systems, by merging them in an environmental justice context as social-ecological

systems. The coalescence of social *and* ecological justice objectives provides a *prescriptive* avenue for seeking (and maintaining) environmental justice, and fosters a unique (to environmental justice scholarship) process for human/nature relationship awareness and strengthening.

The toolkit provides a new conceptualization of how to merge related social and ecological justice goals *in practice*. The toolkit requires environmental injustice scenarios to be examined from both human and non-human points of reference. Although it may seem like a rudimentary set of instructions, the process of realizing and documenting ecological requisites – indicators – is the first step in restoring ecological integrity, which can in turn improve human and non-human health outcomes (Andreasen, O'Neill, Noss, & Slosser, 2001).

The theoretical contributions of this study have implications that can benefit human and non-human communities, as the composite sketch has highlighted. Despite an overall increase in average global income, the gap between haves and have-nots continues to widen as, "billions of human beings are still condemned to lifelong poverty…low life expectancy, social exclusion, ill health, illiteracy [and] dependency" (Pogge, 2005, p. 1) and ecosystems continue to be altered largely due to anthropogenic influences (Summers, Smith, Case, & Linthurst, 2012). Although the structural inequalities that leave certain populations to unequally and unfairly contend with injustices persist, there is consensus that basic human needs such as adequate food, clothing and shelter must be met, as stated in the Universal Declaration of Human Rights (United Nations, 2012). But to simply declare these rights does not go far enough to ensure their materialization. Social justice strategies must go the extra mile to realize the basic ecological services that generate clean food, water and resources for clothing and shelter. Provisioning services (e.g. food and water), regulating services (e.g. water quality), cultural services (e.g. spiritual benefits), and supporting services (e.g. nutrient cycling) all provide the means for basic human rights, and sustain the lives of other non-human species (Millennium Ecosystem Assessment, 2005). Perhaps because we, as humans, do not "pay" for these services outright, we do not value them. We do, however,

"pay significantly for their loss" (Summers et al., 2012, p. 327) in the form of injustice, for example. The new model and toolkit give value to ecosystem services by acknowledging the importance of ecological integrity for meeting basic rights that both humans and non-human species benefit from, thereby improving both human and non-human health outcomes.

4.6 Concluding Comments

Environmental injustices have been investigated for decades; almost 20 years have passed since the United States Environmental Protection Agency created its definition of environmental justice and operationalized the concept as policy (United States Environmental Protection Agency, 2012). Yet the literature on the subject continues to proliferate, signaling that reconciliation between what is known and how environmental decisions are made has not occurred to the extent to which it should. After discovering a deficiency in current, anthropocentric conceptualizations of environmental justice, I propose a more comprehensive re-conceptualization of environmental justice by introducing the concept of ecological integrity. The new model links social and ecological processes to highlight the importance of ecological integrity, while the toolkit serves to propel the new model into practice. Both the EIEJ Model and Toolkit have been developed with strong evidence that links ecosystem and human health, which further suggests the potential for relevance in their application, and ultimately shift distributive justice conversations about 'not here' to proactive and procedural justice conversations of 'not anywhere' (Agyeman & Evans, 2004).

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APPENDIX A: CITATION LIST OF 104 ARTICLES INCLUDED IN THE SYSTEMATIC REVIEW

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APPENDIX B: THE ECOLOGICAL INTEGRITY FOR ENVIRONMENTAL JUSTICE TOOLKIT

An Ecological Integrity for Environmental Justice Appraisal and Action Toolkit

A Community-Based Workbook for Including Ecological Integrity in Environmental Justice

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How to cite this document:

Neimanis, A., Castleden, H., Rainham, D. (2012). An Ecological Integrity for Environmental Justice Appraisal and Action Toolkit: A Community-Based Workbook for Including Ecological Integrity in Environmental Justice. Halifax: Dalhousie University.

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The authors wish to acknowledge the support of the Social Sciences and Humanities Research Council of Canada for funding the development of this workbook through a Joseph-Armand Bombardier CGS Master's Scholarship to A. Neimanis.

An Ecological Integrity for Environmental Justice Appraisal and Action Toolkit

A Community-Based Workbook for Including Ecological Integrity in Environmental Justice

What is environmental justice?

The concept of environmental justice captures the notion that exposures to environmental threats can be asymmetric; certain human populations may be disproportionately affected by harmful environmental hazards (e.g. children, seniors, Aboriginal peoples, immigrants, women).

As defined by the United States Environmental Protection Agency, environmental justice is "the fair treatment and meaningful involvement of all *people* regardless of race, colour, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies".[i] Although the Canadian Environmental Protection Act (1999) makes the claim that "the protection of the environment is essential to the well-being of Canadians"[ii], Canada does not yet have a national environmental justice policy.

Environmental justice investigations 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, to name a few. Such populations, often referred to as 'vulnerable', 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.[iii]

What is ecological integrity?

Ecological integrity is a concept that introduces the inherent potential, stability, capacity for self-repair, and independent management of an ecosystem.[iv] Ecological integrity recognizes the fundamental value that ecosystem functioning has for determining the health of humans and all other life forms. An ecosystem that is functioning properly will show evidence of vigor, resilience, organization, service maintenance, management options, reduced subsidies (e.g. presence of pesticides), survival despite damage to neighbouring systems and the possibility of enhanced human health.[v] Conversely, an exploited ecosystem will display signs of reduced resilience.[vi]

What is an Ecological Integrity for Environmental Justice Model?

A model is a simplified, visual representation of a complex system or process. It can provide a blueprint for problem solving and decision making processes. An Ecological Integrity for

Environmental Justice Model represents a process for restoring and maintaining environmental justice alongside ecological integrity. Because no social-ecological system is static and continuous developments require that we constantly scrutinize our decisions and actions, the model is also cyclical in nature (see Figure 1).

Like ecological systems, human systems share the same characteristics of **Resistance, Resilience and Restoration** (see Box 1). Nested within this cycle are the three phases of **Appreciation, Assessment and Action** (see Box 2). In order to seek and maintain environmental justice alongside ecological integrity, we must determine what we have, what we need, and how we can mobilize.

Box 1
Resistance: The capacity of a system to resist, oppose or withstand environmental disturbance. Resilience: The ability of a system to return to an unimpaired state after environmental disturbance. Restoration: The act of renewing, reviving or reestablishing a system.

Box 2
Appreciation: The act of recognizing and giving value to assets of a community. Assessment: The act of evaluating components of a community to determine any shortcomings. Action: Identifying priorities, roles, resources, allies and benchmarks and designing a timeline.

An Ecological Integrity for Environmental Justice Model

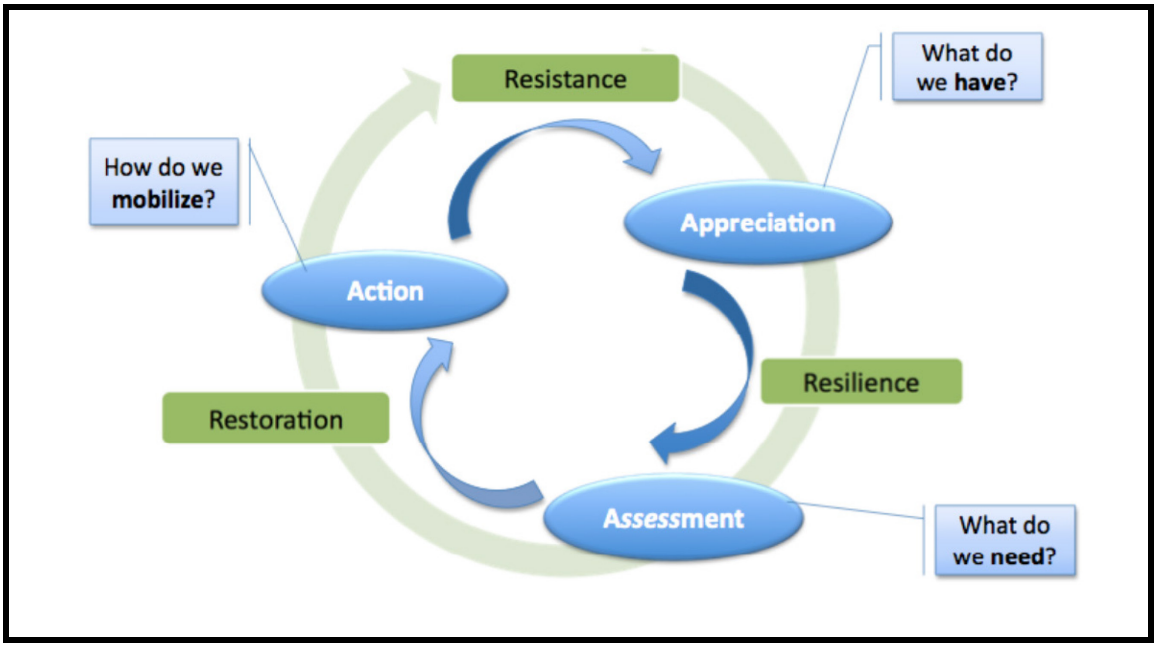

Figure 1: The Ecological Integrity for Environmental Justice Model

What is an Ecological Integrity for Environmental Justice Appraisal and Action Toolkit?

The Ecological Integrity for Environmental Justice Appraisal and Action Toolkit is a workbook that contains a series of open-ended and scale-response questions designed to generate discussion on and prioritize elements of the social equity and ecological integrity of a community.

Why is an Ecological Integrity for Environmental Justice Appraisal and Action Toolkit needed?

As illustrated by the model, human processes are nested within ecosystem processes, and are therefore, deeply reliant on ecological integrity. In fact, humans directly depend on ecosystems for provisioning services (e.g. food and water), regulating services (e.g. water quality), cultural services(e.g. spiritual benefits) and supporting services (e.g. nutrient cycling).[vii]

The interconnection of ecosystem health and the health of all other life on earth has been observed by Indigenous peoples for millennia, and is evermore emerging in mainstream scientific literature. Studies have linked, for example, increased rates of skin cancer with increased ultraviolet radiation exposure caused by the thinning of the protective ozone layer.[viii] Yet, these links - and the concept of ecological integrity - appear to be absent from environmental justice discourse. If we continue to neglect ecological integrity in our efforts to strive for environmental justice, we are putting at risk, not only our own health, but also the health of the non-human species that share our communities.

While the model provides a visual conceptualization of how to reconcile environmental justice with ecological integrity, the toolkit transforms the cognitive model into discourse and action-oriented processes. A toolkit is therefore needed as a way to collect information to assess opportunities, challenges, and gaps within a system to support decision-making and the restoration and maintenance of ecological integrity and environmental justice for all. The objectives of the toolkit are to generate appreciation, make links across the social and ecological components of a system, document changes in community health and prioritize community needs.

Who can use this Toolkit, and how?

This toolkit can be used by a variety of actors (i.e. community groups, non-governmental organizations, academics, government and industry) across a spectrum of settings to raise consciousness about the ecological integrity of a given environment and to draw parallels between both ecological and social maladies. In scrutinizing our actions in relation to ecological integrity and social equity, we are able to realize the contributions of both ecosystems and social systems as important contributors to positive health outcomes.[ix]

When can this toolkit be used?

This toolkit can be used at any time. In fact, this toolkit should be returned to on a regular (e.g. annual) basis to be most effective.

Values: The Foundation of the Toolkit

This toolkit was created with the view that social-ecological systems as they exist today, reflect a long history of decision-making, which has not been adequately inclusive. The toolkit should be used under the condition that everyone has a role to play and is entitled to participate in decisions about their health and the health of the environment. All ideas shared throughout the toolkit process are valid, and furthermore, the process is for restoration for all (human and non-human systems) and shall be maintained.

What makes a Community?

Your community, including all of the people, plants, animals and abiotic (non-living physical features) is reflective of six dimensions: **culture, economy, politics, structures, environment** and **relationships**.[x] Some of these dimensions may appear to apply more to human systems (e.g. economy), but a close examination of these dimensions reveals ecological systems have their own ways of operationalizing these concepts. There are many social and ecological elements to think about in relation to these six dimensions when seeking environmental justice that integrates ecological integrity. This is not an exhaustive list of community composition, but is intended to stimulate your group's discourse on the social-ecological relationships within your community. Additional dimensions or elements may be identified by your particular group.

Getting Started

Now that you have become acquainted with the Ecological Integrity for Environmental Justice Model and the Ecological Integrity for Environmental Appraisal and Action Toolkit, and have gathered as a group, you are ready to begin your guided discussion. Assemble yourselves in a round table format, and be sure to do a round of introductions. Ice-breaking exercises and providing refreshments are good strategies for getting comfortable. Flip charts, markers, pens, and journals are some useful items to have on hand.

Who are we?

Identify the positions that are represented here today:

Who else should be invited into the discussion?

Who (human or non-human) cannot speak on behalf of their own well-being?

What are the boundaries of your community?

Outline any maladies (human and non-human) that you are aware of and would like to draw attention to:

What are the boundaries (the scope) of these maladies? Who and what do you consider to be the affected community?

Do you have any expectations for this process?

What does environmental justice with ecological integrity mean to you?

Stage 1: Appreciating what we have

Think about the following questions in relation to the six dimensions of a community and draw attention to *local* skills, strengths and assets of your community. This stage will help you to conceptualize your cultural identity and vision of a healthy environment. Experiential processes generate local knowledge, and this knowledge is equally as valuable as 'scientific' knowledge. Brainstorm in small groups answers to the questions and appoint a member to relay your answers to the rest of the group. At the end of the exercise, be sure to ask if any perspectives or responses have been left out. The following exercise will help to systematically document the ecological integrity of your community. Remember your strengths, assets and skills, as you will be able to harness them during the action phase of the toolkit.

Culture
What do you value? What binds your community? What does diversity in your community offer? What spaces make you feel at ease, positive and uplifted?
Economy
What sorts of occupations do humans and non-humans have in your community? What resources do you have that provide you with sustenance and safety?
Politics
How are decisions made in your community and who makes them?
Structures
What are some of the institutions present in your community? How do they affect your life?
Environment

Where do you like to go when you spend time outside? What kinds of habitats does your community offer? Think about some beautiful places in your community.

Relationships

Who (human and non-human) do you interact with on a regular basis? What are some of the benefits you gain from your human and ecological relationships?

Record responses here:

Stage 2: Assess your surroundings

The assessment portion of this workbook is designed to identify any gaps (environmental injustices) within your community to help determine what you need to restore social equity and ecological integrity. Some of the questions apply specifically to human systems. **The questions that are *italicized* should be answered from both human and non-human perspectives (as much as humanly possible)**. Read the following questions and consult with one another to determine your response to each question: yes, no or somewhat. At the end of this stage, you will have a definitive list of areas in your community that may need more attention than others. This exercise will help you prioritize your needs in seeking environmental justice that incorporates ecological integrity.

Culture

1. Do we feel like our worldviews and values are respected?

Yes	Somewhat	No

2. Are we able to participate in customs or practices that we value without judgment?

Yes	Somewhat	No

3. Do we value the benefits that healthy environments provide?

Yes	Somewhat	No

4. *Diversity helps human communities to thrive. Is my ecological community biologically diverse*

Yes	Somewhat	No

5. Do we have access to spaces for spiritual practices, health and well-being?

Yes	Somewhat	No

Economy

1. Our economies are nested in the environment. Are the resources we depend on for sustenance managed sustainably?

Yes	Somewhat	No

2. *Ecosystems have their own economies of ecological services. Am I able to provide the service for which I am intended in my system?*

Yes	Somewhat	No

Politics

1. Are we able to participate in decision-making that alters our environment?

Yes	Somewhat	No

2. *Is our right to a healthy environment (or any other constitutionally binding agreement/declaration) upheld?*

Yes	Somewhat	No

3. *Human systems have governing bodies that manage our actions. Healthy ecological systems independently manage themselves. Is our ecological community healthy enough to manage itself?*

Yes	Somewhat	No

Structures

1. Do the governing bodies and institutions that regulate our community separate humans from nature? (i.e. do they separate issues of pollution from our health)

Yes	Somewhat	No

2. *Are the elements (living and non-living) that compose our ecological community natural to this region?*

Yes	Somewhat	No

3. *Healthy ecosystems have the capacity to resist disruption. Is the structure of our ecological community stable?*

Yes	Somewhat	No

Environment

1. Do we live in an environment that is limited in visible environmental deterioration?

Yes	Somewhat	No

2. Have we documented any noticeable changes in our environment?

Yes	Somewhat	No

3. *Do we live in habitat that has safe food, water, shelter and space?*

Yes	Somewhat	No

Relationships

1. *Are we able to adapt to changes in our ecological relationships (i.e. the introduction of new species, pollutants etc.)?*

Yes	Somewhat	No

Stage 3: Mobilize

Now that you have identified gaps (the 'no') in your community, plot your results on the following matrix to help visualize a.) where things are going well in your community, b.) where gaps exist, and c.) where progress has been made (when you return to the questions later on in the maintenance cycle)

Matrix

Yes						
Somewhat						
No						
Previous Cycle Results						
	Culture	**Economy**	**Politics**	**Structures**	**Environment**	**Relationships**

Reflect back to the appreciative stage of the toolkit and identify the skills, assets and strengths in your community, which will help you to mobilize for justice (for all, human and non-human) in the following ways:

Identify Roles:

Leadership

Knowledge

Accountability

Identify Resources:

Skills (Internal)

Skills (External)

Funding (Internal)

Funding (External)

Identify Allies:

Local

Regional

National

International

Identify any support you may need (i.e. psychological, compensation etc.):

Identify any benchmarks (i.e. compensation, apology, consensus):

Create a timeline

The timeline will help maintain the momentum of this process, and you will continue to return to it, as this model is a cyclical process.

Congratulations! You have completed the Ecological Integrity for Environmental Justice Appraisal Toolkit. Be proud of your accomplishment, and be sure to repeat the cycle in order to maintain ecological integrity and environmental justice.

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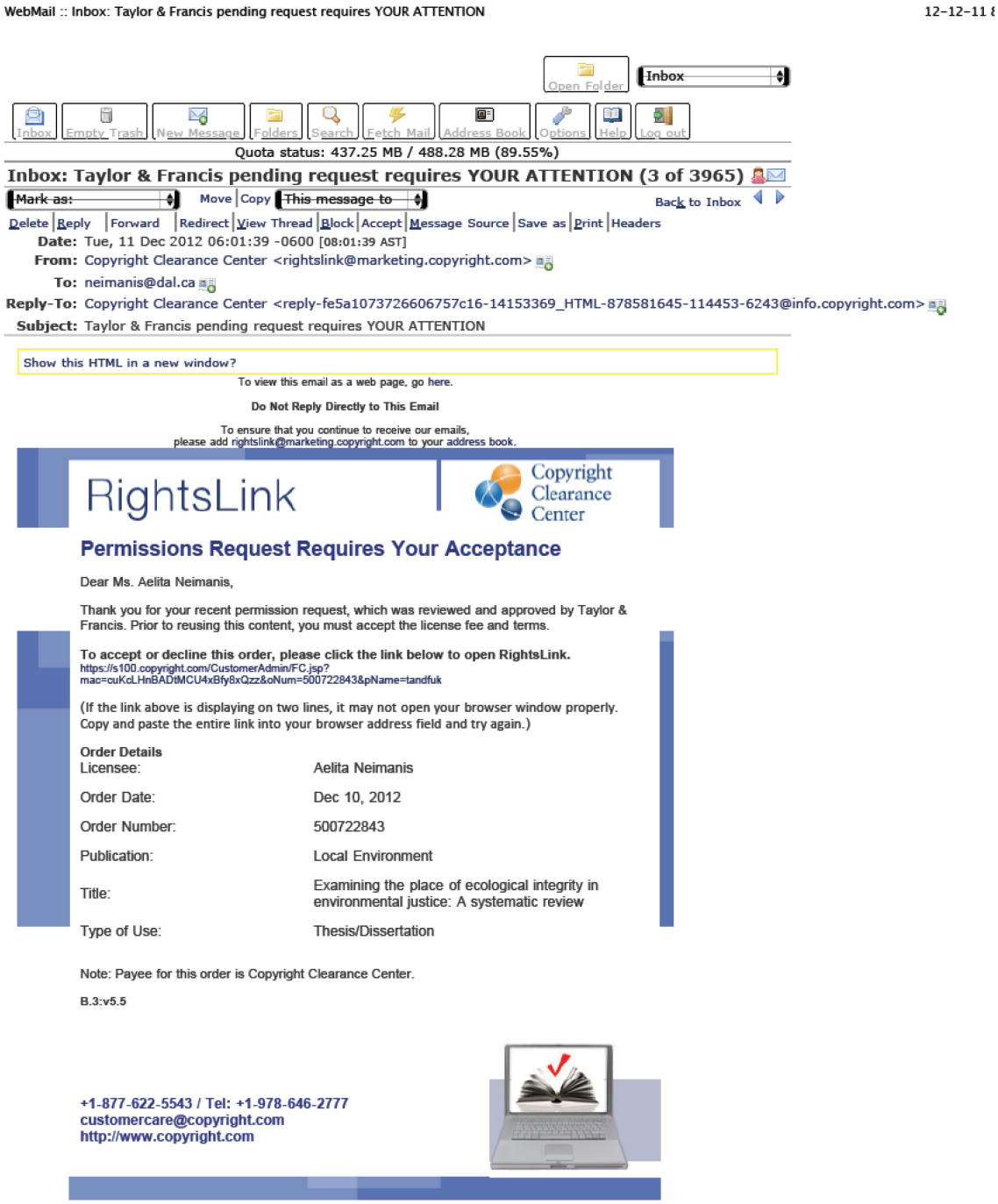
APPENDIX D: COPYRIGHT RELEASE RECEIPTS



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