The **Research** Shop

INDICATORS OF ECOLOGICAL BEHAVIOUR CHANGE

LITERATURE REVIEW IN PREPARATION OF THE IGNATIUS OLD GROWTH FOREST EVALUATION

APRIL 2019

Melisa Choubak*, Rebecca Pereira*, Alexandra Sawatzky**
*Research Shop Assistant
**Research Shop Project Manager

UNIVERSITY of GUELPH

COMMUNITY ENGAGED SCHOLARSHIP INSTITUTE

cesinstitute.ca

ACKNOWLEDGEMENTS

Contributors

The authors would like to acknowledge the following individuals who contributed to this report:

- Jessica Lukawiecki, Research Shop Editorial Assistant (Editor)
- Karen Nelson, Research Shop Coordinator
- Martin Tamlyn, Old Growth Forest Coordinator at Ignatius Jesuit Centre
- Ricardo Ramirez, Consultant: Designing Evaluation and Communication for Impact
- Elin Gwyn, Consultant: E.M. Gwyn Consulting Services

Acknowledgements

The authors would like to acknowledge The Research Shop, and the Community Engaged Scholarship Institute for their support and resources in completing this project. Additionally, we would like to thank the Ignatius Jesuit Centre and the Old Growth Forest Project, as your partnership with us has made this report possible.

cesinstitute.ca

TABLE OF CONTENTS

cesinstitute.ca

COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

INTRODUCTION

This literature review is being conducted for the Old-Growth Forest Project at the Ignatius Jesuit Centre to develop a deeper understanding of how ecological restoration and conservation programming can lead to changes in individual's attitudes, feelings, knowledge and behavior. It will inform the development of a Utilization Focused Evaluation (UFE) framework, which is a method that grants users ownership over the evaluation process to ensure that findings are immediate, relevant and practical. This literature review responds to some of the UFE evaluation questions that assess the levels of behavior change associated with engagement in restoration and conservation activities. The goal of this literature review is:

- To identify methods for assessing changes in an individual's level of environmental awareness and consciousness, using indicators such as expressed attitudes, feelings, self-expressions and knowledge sharing.

This literature review seeks to fulfill the following objectives:

- Inform the development of questions that could be asked in interviews with individuals who have participated in ecological restoration and conservation programming at Ignatius

- Guide analyses, interpretations, and contextualization of responses to interview questions

Background: Pro-Environmental Behaviour (PEB)

The extent to which our environment is protected depends greatly on human behaviour patterns (Steg & Vlek, 2009), which makes it important to understand ecological behaviour change and the factors that influence it. Deforestation, pollution, water contamination, and climate change are just few of the negative human impacts on our environment.

There are many ways of defining Pro-Environmental Behaviour (PEB). Definitions can range from behaviours that preserve the environment (by reducing negative impacts) to those that nurture people's relationships to it (by increasing positive impacts). Most often in the literature, PEBs have been associated with a reduction in negative impacts, rathe r than an emphasis on increasing positive impacts.

For the purpose of this review, PEB can be defined as:

"Behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, reduce waste production)" (Kollmuss & Agyeman, 2002, p. 240)

PEB can manifest itself in a variety of different behaviour types, such as private sphere environmentalism (e.g., saving energy, purchasing recycled goods), non-activist behaviour in the public-sphere (e.g., petitioning on environmental issues), environmental activism (e.g., active involvement in environmental organizations), and behavior in organizations (e.g., product design) (Sawitri, Hadiyanto & Hadi, 2015).

A multi-disciplinary approach is needed as we face a growing number of complex threats to our environment for which different disciplines contribute complementary lenses (Semerjian, El-Fadel, Zurayk, & Nuwayhid, 2004). This review includes perspectives from a variety of disciplines, including insights from psychology, education, sociology, environmentalism, eco-spirituality, indigenous knowledge and restoration ecology. Behaviour is intertwined with many other factors, such as attitudes, feelings, knowledge, and context. All of these contribute to one's personal transformation and are important for our discussion of PEBs.

METHODS

Term searches were conducted on academic and publicly available data bases to find relevant primary, secondary, and grey sources of information on PEBs. These sources were reviewed to determine their relevance and were included in this analysis where appropriate. All of the terms that were searched can be found in (Appendix A). These terms have been grouped and information has been organized under the disciplines of:

cesinstitute.ca

- Psychology

- Education

- Sociology

- Environmentalism

- Eco-Spirituality

- Restoration Ecology

Limitations

One note about limitations of the report, is that although a list of search terms from preliminary searches was provided for this literature review, not all of these search terms were successful. Several of the terms overlapped each other in terms of the literature they were returning, and others were returning information that was far too broad, or extremely specific to one situation.

RESULTS/FINDINGS

A total of 33 sources were included in this analysis. Of these, 23 were from the Social Sciences and Education literature (i.e., psychology, education, sociology), and 10 were from the Environmental and Ecological literature (i.e. environmentalism, eco-spirituality, restoration ecology).

Key Themes

Factors that influence human behaviour in relation to the environment can be categorized into external and internal factors, and three basic general areas are proposed to influence environmental behaviour (Figure 1; Karahan, 2010):
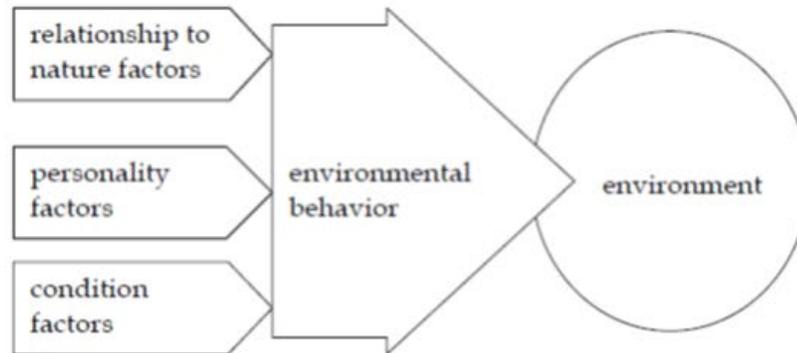
Figure 1. Three factor areas influencing environmental behaviour

A person's behaviour, including in relation to the environment, generally interacts with their capability, opportunity and motivation (COM), a framework suggested by Michie, Van Stralen & West (2011), which roughly aligns with the three broad areas identified in Figure 1.

'Relationship to nature' factors (Figure 1) are explored more in-depth in the Eco-spirituality section, although they are also relevant to the affective and identity components discussed in the Psychology, Education and Sociology sections. 'Personality factors' include capability and motivational factors that direct behaviour. Capability is needed to engage in certain behaviours and can be both psychological and physical; e.g. having the knowledge and skills needed to behave in more environmentally friendly ways. Motivation includes all the processes that direct behaviour. These will be explored further in the Psychology and Education sections. Finally, 'condition factors', similar to opportunity, consist of all the factors external to the person, such as social context and will be discussed in the Sociology section. Similar key themes were prevalent in our findings from the literature. Therefore, we combine the overlapping insights and use these to guide our discussion in this report:

- Intra-personal factors (personality factors, such as motivation and capability)

- Conditions of the environment (external factors, such as opportunity)

- Relationship of individual to nature

Psychology

Steg and Vlek (2009) reviewed relevant literature on psychological factors that influence PEB, and these are summarized in Table 1 in Appendix B (as presented by Kurisu, 2015). For example, individuals may choose to engage in a behaviour because their attitude towards the environment may act as a motivation. They may express that it is "good" or "necessary" behaviour for the environment. Or, they may be motivated due to their affect or emotions, expressing that it is "cool" or that they "like" it. They may also cognitively appreciate the "effectiveness" of the behaviour and have capability to engage in it "easily". These are examples of the intra-personal factors that the psychological literature on PEBs explores, which we will focus on here; they encompass the motivational and psychological capabilities as explained previously.

Most of the intra-personal factors can be categorized into attitudinal ('attitude'), affective ('affect'), or cognitive ('cost and benefit', 'knowledge', 'ability') domains, and this distinction is useful for dissecting the different components of PEBs. Some theoretical models (e.g. Tripartite ABC model by Rosenberg & Hovland, 1960) propose that affective and cognitive underpinnings are associated with overall attitude and, ultimately, behaviour (Fielding, Hornsey & Swim, 2014).   A similar model (Figure 2) has been proposed for environmental consciousness specifically (Jimenez Sanchez & Lafuente, 2010). Below we discuss these affective, cognitive, and behavioural domains in relation to PEBs.
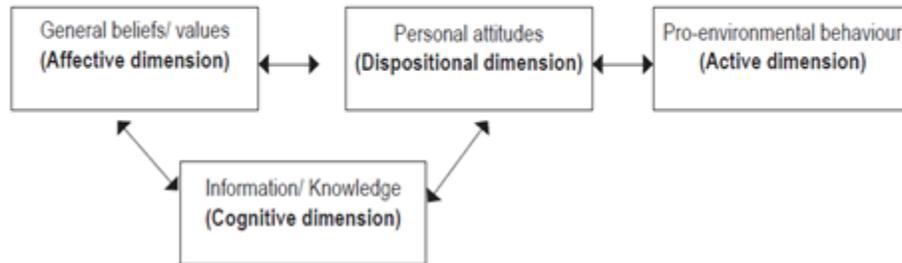
COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

Dimensions of environmental consciousness

Figure 2. Dimensions of environmental consciousness

Affective dimension:

Researchers argue that one's emotional reaction to the environment, particularly environmental degradation, is a strong predictor of engagement in PEB (Grob, 1991, as cited in Dietrich, 2013). Kals, Schumacher, and Montada (1999) developed an "emotional affinity toward nature" scale to identify a theory about how and why people are connected to nature and express positive feelings towards nature. The researchers argue that individuals often engage in PEBs because they are motivated by emotion; for example, they may experience guilt about their own environmental "sins" or express fear over experiencing health problems created by pollution (Kals et al., 1999 as cited in Dietrich, 2013).

While pride can motivate people to behave in (pro-environmental) ways, shame and guilt help people move away from immoral or unethical behaviour because people intend to avoid these negative subjective feelings (Tracy & Robins, 2004; Hynie, MacDonald & Marques, 2006; Onwezen et al., 2013; Leary, 2007, as cited in Fan, 2015). Gratitude also plays a role in people's PEB intentions, as it plays an important role in facilitating costly helping behaviours (Bartlett & DeSteno, 2006 as cited in Fan, 2015). Our emotional reaction to environmental problems is stronger when we directly experience the degradation (Chawla, 1999; Newhouse, 1991 as cited in Fan, 2015). These effects are likely due to the notion that environmental harms produce distress, which lead us to psychological and behavioral responses aimed at relieving us from negative feelings or emotions (e.g., anger or sadness; Kollmuss & Agyeman, 2002). In

addition to emotions contributing to PEB, being immersed within nature, even if exposure is brief, appears to lead to moderate increases in positive emotions, such as joy and happiness (McMahan & Estes,2015). McMahan and Estes (2015), who conducted a meta-analysis of 32 studies also found that exposure to nature decreased negative emotions and improved overall psychological-well-being.

Cognitive dimension:

Capabilities important for PEB include seeking and accessing information; comparing, contrasting, and evaluating information; applying thinking to systems; and reasoning about the application of knowledge and action in environmental contexts (Hollweg, Taylor, Bybee, Marcinkowski, McBeth & Zoido, 2011). These can range from ways of identifying issues to thinking critically about possible solutions. More specific problem-solving skills include the capacity to analyze and evaluate an issue; consider costs and benefits; assess the short- and long-term consequences of actions; communicate clearly; and plan, implement, and evaluate actions. The ability to use information and communication technologies is another important skill (Hollwe g et al., 2011*).*

Social-cognitive theory emphasizes the value of personal agency in engaging in PEB, specifically self-efficacy (i.e., the belief that one is capable), leading to positive outcome expectations (i.e. positive belief about outcome) and goals (i.e. one's intention to engage), which ultimately lead to actions (Sawitri, Hadiyanto &Hadi, 2015). A related concept is "Locus of Control", as a personality measure related to how much people think outcomes depend on their own actions (Rotter 1966), and it consists of "external control" and "internal control." The belief that events can be controlled by external forces, such as fate or higher source, is a belief in external control. If people think events can be driven by their own behaviours, then that is a belief in internal control. This aspect has been considered as one of the influential factors on PEBs (Kurisu, 2015).

Behaviour (Active) dimension:

PEB is multifaceted, and it can include activist behaviour, non-activist public behaviour and private sphere behaviour, and behaviour in organizations. Behaviours can be specific to home, transportation, and purchasing (Lynn, 2014). For specifically Canadian research, Moule (2007) discusses the following 11 categories of PEBs: 'home conservation, food conscious, avoid new purchasing, electricity conservation, political environmental, nature educator, efficiency purchasing, charitable donor, recycling,

COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

reduce driving, and buy local'. These types of distinctions are important as the different classes of behaviour might have quite different facilitators and barriers.

It needs to be noted, that behaviours can be performed for a range of reasons not related to a pro-environmental attitude, and individuals' perception of their own motives can have implications for their future actions. For example, energy conservation behaviours could be performed primarily to reduce carbon emissions or to save money. However, the issue with engaging in PEBs for non-environmental reasons is that it could undermine the development of an overall pro- environmental identity (van der Werff, Steg, & Keizer, 2013 as cited in Fielding et al., 2014) and reduce the likelihood of behavioural spillover (Thøgersen & Crompton, 2009 as cited in Fielding et al., 2014), i.e. adoption of other types of PEB. In other words, the mere existence of PEB does not necessarily indicate environmental consciousness, as it could be engaged in for practical or financial reasons. On the other hand, a pro-environmental attitude does not always lead to PEB, as contextual factors such as the lack of resources must also be considered, as they can inhibit PEBs.

Table 2 in Appendix B shows examples of indicators for environmental consciousness used for each of these dimensions that are discussed above to gauge the level of an individual's environmental consciousness (Jimenez Sanchez & Lafuente, 2010).

Education

As mentioned, an individual's capabilities influence behaviour, and education plays a large role in invoking behavioural change as awareness, knowledge and skills can influence beliefs and attitudes. In addition, cognitive skills are crucial to making these changes (McBride, Brewer, Berkowitz & Borrie, 2013). Cognition and affect play a role in how information is assimilated into existent attitude, and hence psychological variables interplay with environmental education or environmental literacy. As the individual is exposed to new knowledge, the evaluation of this information and identification of environmental problems contribute to whether the information will lead to behaviour change. Furthermore, it depends also on the individual's affect or environmental sensitivity and connectedness to nature.

Environmental literacy consists of knowledge and understanding of a wide range of environmental concepts, problems, and issues; a set of cognitive skills and abilities, and the appropriate behavioral strategies to apply such knowledge and understanding to make sound and effective decisions in a range of environmental contexts. The North

COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

American Association for Environmental Education, NAAEE (2010) emphasizes three goals of environmental education as core areas of an environmental literacy curriculum (as cited in Ireland, 2013):

- To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;

- To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;

- To create new patterns of behavior of individuals, groups and society as a whole towards the environment.

From an educational perspective, we emphasize the components of environmental literacy that are necessary to encourage PEBs. According to Simmons (1995; as cited in McBride et al., 2013), these include affect (environmental sensitivity), cognitive skills, and behaviour. Locus of Control, as discussed previously is also emphasized under the last point (see Table 3 for a detailed description of each in Appendix B). A large part of environmental literacy also refers to different types of knowledge , such as ecological knowledge or knowledge about natural systems, as well as how these systems are influenced by the social systems. Socio-political knowledge and knowledge about environmental issues are also crucial.

Kaiser and Fuhrer (2003) categorize knowledge into four types: (1) declarative (2) procedural (i.e., action- related) (3) effectiveness and (4) social. Declarative knowledge can be defined as awareness and understanding of factual information about the world. It represents the environmental phenomenon or behavior; for instance, the ozone depletion phenomenon. When people act out a behavior, they need to know how to do it. This is the so-called procedural knowledge. The influence of procedural knowledge on PEBs has been well documented for recycling. If people don't know where recycling boxes are placed or how to sort their waste, they cannot appropriately conduct the PEB. Knowledge about effectiveness is knowledge about outcomes of the target behavior. People want to know how much benefit they can get i.e. how much energy is saved or by how much their behaviour is reducing greenhouse gas emissions. Knowing about the effectiveness of their behaviors can enhance people's behaviors. Social knowledge is socially shared or common knowledge and depends heavily on socialization. It consists mainly of normative beliefs about what people think they must do, as is discussed in the Sociology section.

COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

Behaviour is the ultimate expression of environmental literacy. It may not be possible to directly measure the ongoing development of all components of environmental literacy, but it is nevertheless important to recognize that this development occurs on a continuum, and that literacy is facilitated by reflection, further learning, and additional experiences. The NAAEE Assessment Framework uses 'domains and components' to guide assessment for environmental literacy (Hollweg et al., 2011). The literature on environmental education suggests four interrelated components for assessment: knowledge (e.g. what they know about physical and ecological systems), dispositions (e.g. how they respond to environmental issues), competencies (i.e. skills and abilities they can apply), and environmentally responsible behavior (i.e. involvement in behaviours towards solving and preventing problems; Hungerford & Volk, 1990; Cook & Berrenberg, 1981; Stern, 2000 as cited in Hollweg, 2010). Figure 3 in Appendix B provides more details on the domain of environmental literacy and some indicators for progress over time through these four components (NAAEE, 2011).

As we see, context and external factors play a role from both psychological, as well as educational standpoints. In the next section, we turn to the sociological factors such as social identity, socio-cultural context, as well as institutional factors such as policies, that may encourage or inhibit behaviour.

Sociology

As social beings, the components discussed so far relevant to PEBs are not shaped within an isolated vacuum. There are 'condition factors', 'relationship with nature' (Figure 1), and/ or factors pertaining to social and physical opportunities as discussed before. As mentioned above, psychological perspectives emphasize identity and social norms to be crucial factors in determining values and behaviour. Similarly, much education takes place within the context of social interaction and cultural context.

Social identities can be crucial as seen from a sociological or social psychology standpoint; the Environmental Identity and its prominence, salience, and commitment to this identity plays an important role in one's relationship to nature, as well as to others who share this identity. Environmental identity includes the meanings that one attributes to the self as they relate to the environment, and these self-meanings can range from non-exploitative and supportive to exploitative and non-supportive (Stets & Biga, 2003). Casting environmental problems within a framework of shared identity may be an effective strategy at encouraging PEBs, particularly in situations where environmentally

COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

harmful behaviour is personally rewarding. In support of this, people with a strong regional identity express that they engage in more PEBs to protect not only their local region (Carrus, Bonaiuto, & Bonnes, 2005; Stedman, 2002 as cited in Duke, 2010) but also the entire globe (Pol, Moreno, Guàrdia, & Iniguez, 2002; Uzzell, Pol, & Badenas, 2002; Valera & Guàrdia, 2002; Vaske & Kobrin, 2001 as cited in Duke 2010).

In addition to identity, the surrounding socio-cultural context and norms, as Kollmass and Agyeman (2002) hypothesized, are quite an important contributing factor, as they believe that "cultures in small, highly populated countries such as Switzerland and The Netherlands tend to be more resource conscientious than societies in large, resource-rich countries, such as the USA" (p.249). Ando et al. (2010) compared PEBs between Japan and Germany and pointed out that Japanese subjective norm influences were stronger than German ones (as cited in Kurisu, 2015). Studies have shown that for Japanese people the subjective norm effect on behaviors is much larger than in other cultures (Abrams et al. 1998; Ando et al. 2007; Lee et al. 2013 as cited in Kurisu, 2015)

In addition to individual barriers, social and institutional barriers and rewards come into play when considering PEBs. These barriers can create a gap between attitude and behaviour. For example, someone expressing a pro-environmental attitude may not express a PEB due to the presence of barriers that constrict their behaviour, demonstrating that there are factors related to practicality that need to be considered (Figure 4, Blake, 1999).

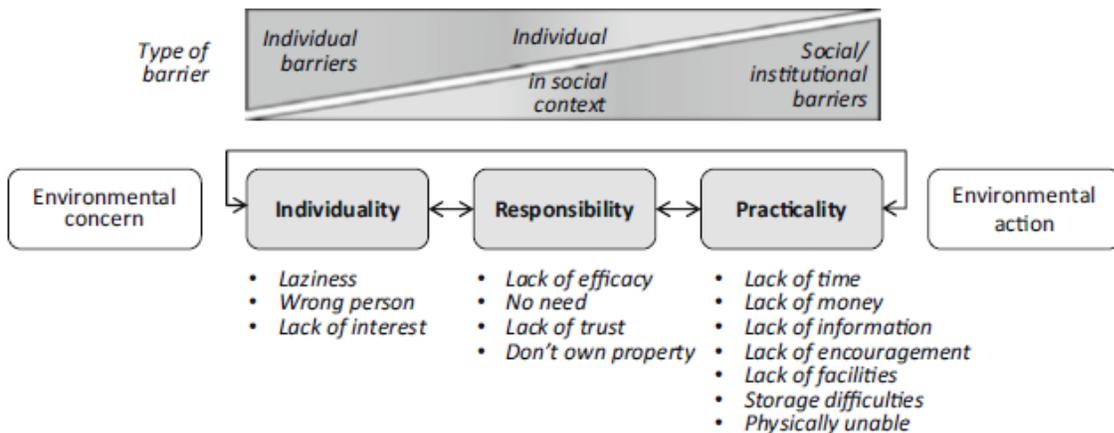COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

Figure 4. Barriers between environmental concern and action

For example, institutional factors can explain regional differences between PEB practices. In regions where public transportation is not well provided, people cannot select a public transportation option. Instead of a charging system, some regions have reward systems, such as subsidies and deposits, which can also enhance PEBs (Kurisu, 2015). When subsidies for eco-facilities, such as solar panels and composting machines, exist in a region, it can enhance the installation of those facilities there. In the case of product selection, availability is an important influential factor. For instance, no matter how much you might want to use refillable products, you are unlikely to use them if the closest supermarket doesn't offer this option (Kurisu, 2015).

This highlights the value of policy, i.e. actions on the part of responsible authorities that reward PEBs or make non-PEBs costly (Michie et al., 2011). The 'Behaviour Change Wheel' in Figure 5 (Mitchie et al., 2011) illustrates the importance of surrounding socio-cultural or political climate on PEBs, as well as emphasizes the inter-relatedness of factors discussed so far. This highlights the inter-relatedness between capability, motivation, opportunity as intra-personal factors, and interventions and policies, which represent the social influences or external factors contributing to PEBs.
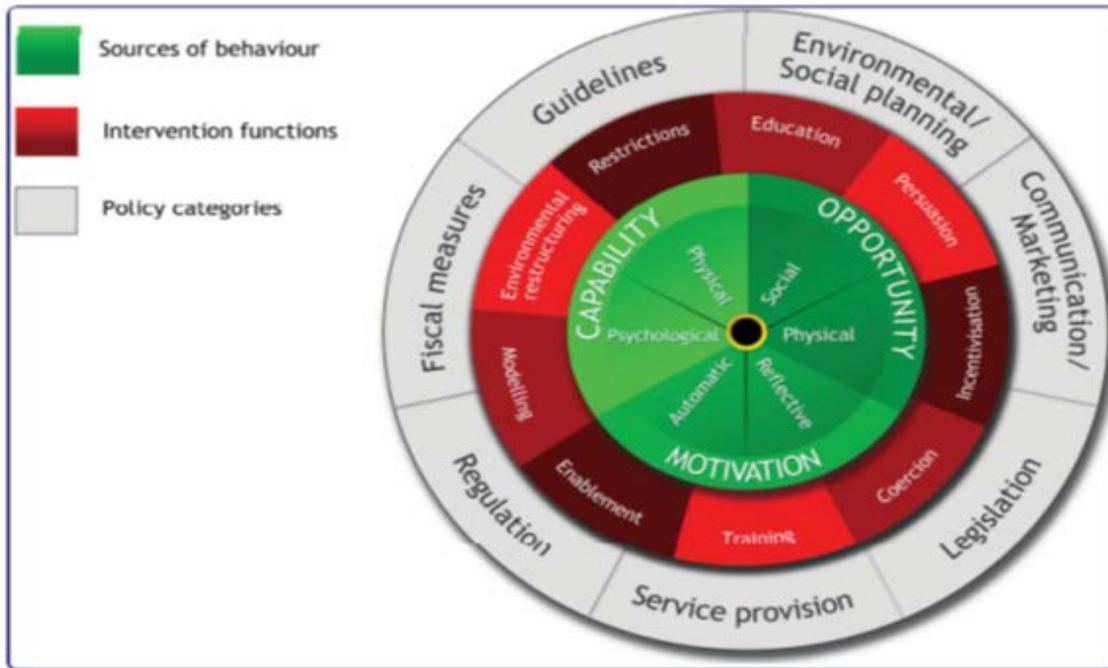
Figure 5. The Behaviour Change Wheel

Environmentalism:

Environmental stewardship was seen to impact behaviour in several studies found throughout the literature. Fisher et al. (2015) link environmental stewardship to democracy. They found that individuals who participated in a tree planting initiative would be more socially motivated to reshape their city, not just visually but from within the social fabric. This idea is also reflected in Bogden et al.'s (2016) study which discusses the Connected to Nature theory. This theory holds that being connected to nature may not be enough to explain why one would want to conserve land, and that PEBs may be better explained using social psychological models.

In urban areas people are finding new ways of practicing stewardship which will result in environmental, community and individual outcomes (Krasny & Tidball 2012). These activities are generally small, and self-organized but can be expanded to partnerships with large agencies (Krasny & Tidball 2012). The activities can be anything from community gardening to tree planting, and can begin after a period of economic decline,

or suddenly after an ecological disruption in the form of a natural disaster (Krasny & Tidball 2012). These pro-social behaviours are often done without rewards, or benefits to another person, and is also another example of participating that is linked to democracy (Measham & G. B. Barnett). Measham & G. B. Barnett (2008) refer to this as environmental volunteering, explaining that there are six motivations for participating: contributing to community, social contact, personal development, learning about the environment, a general care for the environment, and an attachment to a particular place. Personal development was not selected by many people as their motivation for volunteering, however educating others was the most common mode of environmental volunteering (Measham & G. B. Barnett 2008). It seems that personal development, which related to behavioural change may be something that occurs unknowingly by the volunteer, and the lessons that they have learned will then help them to teach others (Measham & G. B. Barnett 2008).

Although learning about the environment has mostly been portrayed as a positive thing, it can be related to pain and loss, as "one of the penalties of an ecological education is that one lives alone in a world of wounds" (Cunsolo & Ellis 2018:276). This feeling is called ecological grief, and it can be the result of a personal distress relating to a death of a loved species or ecosystem (Cunsolo & Ellis 2018). Additionally, ecological grief is related to human's experience in the Anthropocene, which is our current geological period, as this is an era where humans are overwhelmed with ecological decline and loss of the environmental future (Cunsolo & Ellis 2018). Environmental grief is related to one's concern for the environment, and their beliefs. This will be discussed more in relation to eco-spirituality.

Eco Spirituality:

One's behaviour about the environment can be related to their eco-spirituality. There have been increased discussions about Bron Taylor's Dark Green religion, as it is a growing phenomenon, and followers experience connectedness to nature, and believe it to be sacred (Koehrsen 2018). Although this is a growing trend, it is quite new, and more studies are needed to learn more about it (Koehrsen 2018). De Klerk (2014) also discusses the religious aspects of environmentalism, however instead of creating a new ecologically focused religion he suggests that the church should engage with ecological issues. In order to enhance the church goer's ecological consciousness, de Klerk (2014) believes that they must praise, pray, and confess their guilt, while they witness that God's creations are suffering. Through prayer they believe that there are new

17

possibilities and that God may be able to break the cycle (de Klerk 2014). Spiritual values of indigenous communities can also be linked to ones behavior about the environment. Richardson (2008) noted that environmental norms could be attributed to spiritual values, because some indigenous communities might protect land due to its association with spirits or cultural deities. The eco-spirituality of indigenous communities is associated with the passing down of traditional knowledge, but like all other cultures, indigenous peoples environmental relationships are dependent on the particular customs of their community (Richardson 2008).

Development of an ecological consciousness is something that can occur after exposure to aspects of ecological culture. Vinokurova et al. (2015) discuss the development of environmental consciousness in school children through exposure to philosophical and methodological levels of ecological development. This mixed method of exposure was due to the researcher's belief that the creation of an ecological culture within an individual is based on the interrelations of all spheres of the individuals' mentality, and it unfolds in three stages. The first, the 'cultural and adaptation stage' is connected to emotions and emotional connections to ecological problems. The second, the 'cultural and notional stage' relies on the individuals understanding of ecological knowledge and value. Finally, the 'cultural and artistic stage' is connected to the engagement of school children into creative activities aimed to resolve ecological problems on different stages. This study found that 72 percent of students that were exposed to all three of these stages identified that they developed an aspect of ecological culture.

Additionally, Boiral et al. (2013) discuss how an ecological conscious is developed through the different way's individuals make sense and experience consciousness. They refer to the three states of consciousness as cognitive, affective and operative, and each of these stages is connected to emotional experiences, including understanding one's goals and purpose in life. This study focuses on corporations and how they became ecologically conscious, however these states of consciousness can be applied to others who become more environmentally aware, such as students.

Restoration Ecology:

Restoration ecology has been written about in several ways, from a scientific endeavor to a subjective value driven process. Egan et al (2011), discuss how the root of ecological restoration is to have better relationships between humans and the rest of the

world. They discuss restoration ecology in three themes, participation, power and perspective, explaining that the way that people intersect will determine the success of the effort. In Diekmann (2011), the author discusses how ecological restoration occurs in a community because all the members have a shared vision of restoration that is rooted in their culture. The communities also had a sense of belonging and connection that encouraged them to come together and make the change (Diekmann 2011). With this in mind we can consider restoration ecology as a community concept, with specific programming being developed to fit the roles of individuals and groups within the larger community.

Diekmann (2011) also incorporates a discussion on environmental justice, as some restoration ecology attempts to correct environmental injustices, by linking social issues to the environmental ones. Then the restoration acts as a tool to inform the social conditions by linking them to the ecological and cultural processes. This restoration then becomes motivated through a political relationship. However, these acts often work to perpetuate the inequalities of the community rather than resolve them. Restoration ecology has the ability to create a relationship that is mutually beneficial for people and nature, however it can often fail, because of the people doing the work and the intersections between them and the environment they are attempting to restore. Further research is being done to understand who is actually benefiting from participating in restoration, whether it be people who are already privileged or if there are social benefits for those who have less power in society.

IMPLICATIONS AND CONCLUSIONS

This literature review has taken a broad multi-disciplinary approach to exploring environmental consciousness and Pro-environmental behaviour, and the components that may influence and be indicative of them (e.g. attitudes, feelings, self-expressions, and knowledge-sharing). We hope this report will be helpful to the Old Growth Forest Coordinator at the Ignatius Jesuit Centre in this valuable work pertaining to restoration and building human-nature connections. Additionally, this work is intended to be useful to others and be used as a tool to determine programming for specific groups, such as school children or working adults in an attempt to inspire them to continue to live ecologically conscious lives.

Moreover, it is hoped that this project provides exposure to readers about the Ignatius Jesuit Centre, so that they may feel inspired to visit the Centre and experience for

themselves the four pillars emphasized by its programs, namely beauty of the land, mystery, knowledge, and gratitude.

REFERENCES

Blake, J. (1999). Overcoming the 'value-action gap' in environmental policy: Tensions between national policy and local experience. Local Environment, 4(3), 257–278. Retrieved from: https://doi.org/10.1080/13549839908725599

Bogdon, Z., Drescher, M., & University of Waterloo. School of Planning. (2016). Towards understanding the development of connectedness-to-nature, and its role in land stewardship behaviour. Waterloo, Ontario, Canada: University of Waterloo. 1-119. Retrieved from: https://uwspace.uwaterloo.ca/bitstream/handle/10012/10277/Bogdon_Zachary.pdf;sequence=3

Borial, O., Baron, C., Gunnlaugson, O., (2013). Environmental leadership and consciousness development: A Case Study among Canadian SMES. Journal of Business Ethics, 123(3):363-383. Retrieved from: https://corpus.ulaval.ca/jspui/bitstream/20.500.11794/13659/2/Environmental%20leadership%20and%20consciousness%20development%20A%20case%20study%20among%20Canadian%20SMEs.pdf

Cunsolo, & Ellis. (2018). Ecological grief as a mental health response to climate change-related loss, Nature Climate Change 8: 275–281. Retrieved from: https://www.nature.com/articles/s41558-018-0092-2

Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. Health Psychology Review, 9(3), 323–344. Retrieved from: https://doi.org/10.1080/17437199.2014.941722

de Klerk, B.J. (2014). Enhancing ecological consciousness through liturgical acts of doxology and lament. Verbum Et Ecclesia,35(2), 1-8. Retrieved From: https://verbumetecclesia.org.za/index.php/ve/article/view/859/1920

Diekmann, L. (2011). Ecological Restorations for Community Benefit: People and landscapes in Northern California, University of California, 1840-2010. Retrieved from: https://escholarship.org/uc/item/1365d8cr

Dietrich, H. (2013). The Role of Emotion in Environmental Decision Making (Dissertation). Retrieved from: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1055&context=psychdiss

COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

Duke, C. C. (2010). Social Identity and the Environment: The Influence of Group Processes on Environmentally Sustainable Behaviour, Retrieved from: https://core.ac.uk/download/pdf/12827064.pdf

Fan, N. (2015). The Role of Emotions in Stimulating Pro-environmental Behaviour on Social Media (Master's thesis). Retrieved from http://edepot.wur.nl/346058

Fielding, K. S., Hornsey, M. J., & Swim, J. K. (2014). Developing a social psychology of climate change: Editorial. European Journal of Social Psychology, 44(5), 413–420. Retrieved from: https://doi.org/10.1002/ejsp.2058

Fisher, D., Svendsen, E., Connolly, J., & Taylor & Francis (2015). Urban environmental stewardship and civic engagement: How planting trees strengthens the roots of democracy. Abington, Oxon,: New York, NY: Routeledge.

Hollweg, K. S., Taylor, J. R., Bybee, R. W., Marcinkowski, T. J., McBeth, W. C., & Zoido, P. (2011). Developing a framework for assessing environmental literacy. Washington, DC: North American Association for Environmental Education. Retrieved from: http://www.naaee.net.

Ireland, L. (2013). Environmental Education Framework. Retrieved from https://www.abcee.org/cms/wp-content/uploads/2013/04/Alberta-Environmental-Education-Framework-Sept-9.pdf

Jiménez Sánchez, M., & Lafuente, R. (2010). Defining and measuring environmental consciousness. Revista Internacional de Sociología, 68(3), 731–755. https://doi.org/10.3989/ris.2008.11.03

Kaiser, F. G., & Fuhrer, U. (2003). Ecological Behavior's Dependency on Different Forms of Knowledge. Applied Psychology: An International Review, 52 (4), 598-613.

Kollmuss, A., and Aguyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental education Research, 8 (3), 239-260. https://doi.org/10.1080/13504620220145401

Krajhanzl, J. (2010). Environmental and Pro-environmental Behavior. School of Public Health, 21, 251-274.

Krasny, M., & Tidball, K. (2012). Civic ecology: A pathway for Earth Stewardship in cities. Frontiers in Ecology and the Environment, 10(5), 267-273.

Kurisu, K. (2015). Influential Factors on PEBs. In K. Kurisu, Pro-environmental Behaviors (pp. 27–46). Tokyo: Springer Japan. https://doi.org/10.1007/978-4-431-55834-7_2

Lynn, P. (2014). Distinguishing Dimensions of Pro-environmental Behaviour. ISER Working Paper Series 22. Retrieved from https://www.econstor.eu/bitstream/10419/123804/1/784977437.pdf

McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. (2013). Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here? Ecosphere, 4(5), art67. Retrieved from:https://doi.org/10.1890/ES13-00075.1

McMahan, E. A., & Estes, D. (2015). The effect of contact with natural environments on positive and negative affect: A meta-analysis. *The Journal of Positive Psychology*, *10*(6), 507–519. https://doi.org/10.1080/17439760.2014.994224

Measham, T & Barnett, G. (2008). Environmental Volunteering: motivations, modes and outcomes. Australian Geographer 39 (4) pp.537-552. Retrieved From:

https://publications.csiro.au/rpr/download?pid=procite:a589c77b-5a03-4ac8-a7fb-4d31f4dd7044&dsid=DS1

Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterizing and designing behaviour change interventions. Implementation Science, 6(1). Retrieved from: https://doi.org/10.1186/1748-5908-6-42.

Moulé, D. E. W. (2015). Exploring Pro-Environmental Lifestyles & Values in Canada (Master's thesis). Retrieved from: http://summit.sfu.ca/item/14930.

Richardson, B. (2008). The ties that Bind: Indigenous People and Environmental Governance. Comparative Research in Law & Political Economy, 4 (5) 1-52.

Robertson, & Barling. (2017). Toward a new measure of organizational environmental citizenship behavior. Journal of Business Research, 75, 57-66. Retrieved from: https://psycnet.apa.org/record/2017-13685-008

Rosenberg, M.J. and Hovland, C.I. (1960) Cognitive, affective and behavioral components of attitudes. In: Hovland, C.I. and Rosenberg, M.J. (Ed.), Attitude Organization and Change (pp.1-14), New Haven, CT: Yale University Press.

Rotter, JB. (1966) Generalized expectancies for internal versus external control of reinforcement. Psychol Monogr: Gen Appl 80(1):1–28.

Sawitri, D. R., Hadiyanto, H., & Hadi, S. P. (2015). Pro-environmental Behavior from a social Cognitive Theory Perspective. Procedia Environmental Sciences, 23, 27–33. Retrieved From: https://doi.org/10.1016/j.proenv.2015.01.005

Semerjian, L., El-Fadel, M., Zurayk, R., & Nuwayhid, I. (2004). Interdisciplinary Approach to Environmental Education. Journal of Professional Issues in Engineering Education and Practice, 130(3), 173–181. Retrieved from: https://doi.org/10.1061/(ASCE)1052-3928(2004)130:3(173)

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. Journal of Environmental Psychology, 29(3), 309–317. Retrieved from: https://doi.org/10.1016/j.jenvp.2008.10.004

Stets, J. E., & Biga, C. F. (2003). Bringing Identity Theory into Environmental Sociology. Sociological Theory, 21(4), 398–423. https://doi.org/10.1046/j.1467-9558.2003.00196.x

Vinokurova, N., Nikolina, V., Shevchenko, I., Efmova, O. (2015). A Coevolutionary Model of Environmental Consciousness Development Among School Children on the Basis of Sustainability Concepts. Mediterranean Journal of Social Sciences, 6 (6S2), pp. 315-324. Retrieved From: http://www.mcser.org/journal/index.php/mjss/article/view/8099/7763

APPENDIX A: SEARCH TERMS

Psychology

- Pro-environmental Behaviour
- Ecological Psychology
- Environmental Psychology
- Internal factors and external factors

Education

- Environmental Literacy
- Environmental Education

Sociology

- Social identities
- Environmental identity
- Social norms
- Social context

Environmentalism

- Stewardship
- Sustainability
- Environmental ethics
- Environmental citizenship
- Environmental sensitivity
- Environmental rationality

cesinstitute.ca

Eco Spirituality:

- Environmental emotions
- Environmental consciousness
- Environmental concern
- Ecological grief
- Atonement
- Idealistic motivations
- Reconnection with nature

Indigenous Sciences:

- Stewardship
- Reciprocity
- Culturally-grounded change
- Cultural worldviews
- Cultural continuity
- Community connectedness
- Land-based relationships

Restoration Ecology:

- Ecosystem services
- Environmental justice
- Ecological valuation
- Human dimensions of ecological restoration

cesinstitute.ca

APPENDIX B: ADDITIONAL TABLES AND FIGURES

Table 1. Possible reasons to conduct/not to conduct the target PEB

Factor	Reasons to conduct	Reasons not to conduct
	Because...	
Norm	It is a rule	It is not a rule
	It is expected by other people	It is not expected by other people
	It is being done by other people	Nobody is doing it
	It is moral	It is amoral
Attitude	It is environment friendly	It is not environment friendly
	It is necessary behavior	It is not necessary behavior
	It is good behavior	It is not good behavior
Affect	It is cool	Is not cool
	I like it	I do not like it
Cost and Benefit	It saves money	It costs [too much] money
	It is beneficial	It is not beneficial
	Time is saved	It is time consuming
	It is not bothersome	It is bothersome
Knowledge	I know the meaning of the behavior	I do not know the meaning of the behavior
	I know the procedure	I do not know the procedure
	I know the effectiveness	I do not know the effectiveness
Ability	It is easy to do	It is difficult to do
Habit	It is a habit	Can be forgotten
Opportunity	There are many chances to conduct	There are no chances to conduct
Surrounding condition	There are many products to choose from	There is no choice of products
	There are sufficient facilities	There are insufficient facilities
Sub-effect	Is good for health	Is not good for health
	It is comfortable	Is not comfortable

(Kurisu, 2015)

Table 2. Indicators for environmental consciousness

Dimension	Facets	Indicators
Affective	Perceived severity of environmental conditions	assessment of global environmental conditions
	Support for general worldview	level of agreement with the statement: "We are too concerned about the environment and not about prices or the current job situation"
	Support for specific pro-environmental measures	endorsement of different measures to improve water management
Cognitive	Information and knowledge	extent to which respondents consider themselves to be informed about environment-related issues index of specific environmental knowledge
Dispositional	Attitude towards individual pro-environmental behaviour (personal moral norm and self-efficacy)	level of agreement with the statement: "it is very difficult for a person like me to be able to do anything for the environment"
	Attitude regarding the personal costs of pro-environmental measures	level of agreement with the pro-environmental proposal to "pay more for water"
Active[1]	Engagement in low-cost individual behaviours	index of the extent of recycling (glass, paper, plastic)
	Engagement in collective pro-environmental actions	index of activism (petitioning on environmental issues, taking part in demonstrations, doing volunteer work, collaborating in organizations, making donations)

(Jimenez Sanchez & Lafuente, 2010)

[1] for technical reasons we have not included an indicator on high-cost individual behaviour.

Table 3. Components of Environmental Literacy

Component	Description
Affect	Environmental sensitivity or appreciation, in terms of responsible attitudes toward pollution, technology, economics, conservation, and environmental action, and a willingness to recognize and choose among differing value perspectives associated with problems and issues. Motivation to actively participate in environmental improvement and protection, desire to clarify one's own values, and confidence to make decisions and judgments about environmental issues according to one's sense of morality.
Ecological Knowledge	An ability to communicate and apply major ecological concepts including those focusing on individuals, species, populations, communities, ecosystems, and biogeochemical cycles. An understanding of energy production and transfer, and the concepts of interdependence, niche, adaptation, succession, homeostasis, limiting factors, and humans as ecological variables. An understanding of how natural systems work, as well as how social systems interface with natural systems.
Socio-Political Knowledge	A clear awareness of economic, social, political and ecological interdependence in urban and rural areas; i.e., how human cultural activity influences the environment from an ecological perspective. An understanding of the basic structure and scale of societal systems and of the relationships between beliefs, political structures, and environmental values of various cultures. Geographic understanding at local, regional, and global levels and recognition of patterns of change in society and culture.
Knowledge of Environmental Issues	An understanding of various environmentally-related problems and issues and how they are influenced by political, educational, economic, and governmental institutions. Understandings of air quality, water quality and quantity, soil quality and quantity, land use and management for wildlife habitat, and human population, health, and waste.
Cognitive Skills	Identification and definition of environmental problems/issues, and the analysis, synthesis, and evaluation of information about these issues using both primary and secondary sources and one's personal values. Abilities for selecting appropriate action strategies and creating, evaluating, and implementing action plans. Abilities to conduct scientific inquiry and basic risk

	analysis, think in terms of systems, and to forecast, think ahead, and plan.
Environmentally Responsible Behaviours (ERB)	Active participation aimed at problem solving and issues resolution. Action through selected lifestyle activities, including environmentally sound consumer purchasing, using methods for conserving resources; assisting with the enforcement of environmental regulations; using personal and interpersonal means to encourage environmentally sound practices; and supporting environmentally sound policies and legislative initiatives.
Additional Determinants of ERB	A locus of control and assumption of personal responsibility. Locus of control is an individual's perception of his or her ability to bring about change because of his or her behavior; individuals possessing an internal locus of control believe their actions are likely to advance change (see Hines et al. 1986, Newhouse 1990).

(McBride, Brewer, Berkowitz & Borrie, 2013)

COMMUNITY ENGAGED
SCHOLARSHIP INSTITUTE

Figure 3. The domain of environmental literacy

Feedback/reflection loop continued literacy development

Knowledge

What you know about:
• Physical and ecological systems
• Social, cultural and political systems
• Environmental issues
• Multiple solutions to environmental issues
• Citizen participation and action strategies

Competencies

Skills and abilities that you know how and when to apply:

• Identify environmental issues
• Ask relevant questions about environmental conditions and issues
• Analyze environmental issues
• Investigate environmental issues (scientific and social aspects of issues using primary and secondary sources)
• Evaluate and make personal judgments about environmental issues (the interaction between environmental conditions and sociopolitical systems)
• Use evidence and knowledge to select and defend one's own position(s) to resolve issues
• Create and evaluate plans at various scales/levels to resolve environmental issues

Environmentally Responsible Behavior

Involvement in intentional and habitual behaviors, individually or as a member of a group, that work towards solving current problems and preventing new ones.

Contexts

Personal, Social, and Physical

Dispositions

How you respond to environmental issues:
• Sensitivity
• Attitudes and concern toward the environment
• Assumption of personal responsibility
• Locus of control/ Self-efficacy
• Motivation, and intention to act

(NAAEE, 2011)

UNIVERSITY of GUELPH

COMMUNITY ENGAGED SCHOLARSHIP INSTITUTE

cesinstitute.ca