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Resource Governance and Environmental Sustainability: Experiences in Canada's Hemp Industry

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RESOURCE GOVERNANCE AND ENVIRONMENTAL SUSTAINABILITY: EXPERIENCES IN CANADA'S HEMP INDUSTRY

by

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ABSTRACT

This study investigates how structural obstacles facing the Canadian hemp industry impede development in directions that will help hemp's environmental benefits become realized. Green Criminology and eco-Marxism aid in analyzing these obstacles, (re)defining them as environmental harms, and conceptualizing alternatives. Interviews with eleven members of Canada's hemp industry provided valuable information regarding what impacts the industry. Four themes developed through the analysis of interview data include: (1) the impact of negative public perceptions on the industry; (2) regulatory inadequacies; (3) economic influences on market and technological experiences; and (4) environmental impacts influenced by the preceding themes. These interrelated themes help explain how the development of the industry in environmentally beneficial directions and the decision making of industry members vis-à-vis the environment are impacted by external factors.

Keywords: industrial hemp, environmental harm, Green Criminology, eco-Marxism

DEDICATION

To Mary and Jody, for your continuous love

and support.

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The environmental sustainability[1] of our current politico-economic system is certainly in question. As an inadequate governance of valuable resources can significantly harm the environment, the way in which the world's resources (both renewable and non-renewable) are governed will determine the conditions of future generations. Unfortunately, potential strategies for correcting such harms are interlaced with "the political economic structures of capitalism" which guide much of the "public perception about, and definitions of environmental harm and provide the basic frameworks for existing 'management' practices in relation to this harm" (White 2002:85). What is perceived as harmful and what strategies are used to control these harms are influenced by external forces and need critiquing to ensure definitions of harm are not biased or static. Thus, the way in which resources are governed and how harms against the environment are envisioned needs deconstructing and redefining.

It is valuable to acknowledge that what is environmentally 'harmful' and what is environmentally 'sustainable' are constructed social renderings which vary across time and space (Halsey 2004; Lynch and Stretsky 2003). Harm, as a concept, can be seen as both "fluid" (who or what can be harmed is ever-changing) (Halsey 2004:849), and relative (a process may not be entirely harmless, but may appear rather benign when compared to a process it could replace) (Halsey 1997). Understanding the constructed, fluid and relative nature of 'harm' is critical in conceptualizing alternatives. This study utilizes the perspective of Green Criminology to pursue the "*proliferation and diversification of environmental strategies*," providing a means to maintain a continuous renewal of alternatives without naively following single 'solutions' (Halsey 2004:848). Framing the pursuit of change in terms of regularly evaluated alternatives is valuable in

acknowledging the subjectivity behind the structures and actors developing these strategies.

Industrial hemp is the focus of this study because a considerable degree of environmental degradation could be mitigated by the increased production of renewable resources like industrial hemp in place of non-renewable resources like old-growth trees (Burczyk, Grabowska, Kolodziej and Strybe 2008; Gibson 2007; Roulac 1995; Vantreese 1998). Evaluating the position taken by the politico-legal system regarding the environmental impact of varying resources aids in understanding why alternative resources like hemp are underutilized. Halsey (1997) argues,

> By not labeling practices such as clearfelling old-growth forest as socially and ecologically unacceptable (and the cultivation of fibre hemp as ecologically benign), the politico-legal realm sends a message to each of its constituents that the relation between capitalist political economy and the principles of modern ecology is entirely sound when clearly it is not (P. 139).

In some circumstances, the politico-legal realm can be viewed as fostering the acceptance of using non-renewable resources when alternatives are available (Halsey 1997). However, it is critical to consider the economic, social and ecological domains which interlace with politico-legal structures to form the complex collection of forces impeding the growth of the Canadian hemp industry in directions that will help hemp's environmental benefits become realized (e.g., through more sustainable farming and processing methods and replacing products made from non-renewable materials). The limitations these forces place on the industry need to be considered in the defining and managing of environmental harms. A review of the current literature regarding industrial hemp provides context for this multifaceted set of forces.

INDUSTRIAL HEMP: CURRENT LITERATURE

Canada's Hemp Industry

Industrial hemp[2] has been utilized globally for thousands of years (Brook 2008:1); however, production in Canada has fluctuated over time. Before the twentieth century, Canada had been a "major hemp-growing region" (Roulac 1997). Industrial hemp production was prohibited in Canada in 1938 and did not return to a commercial level until 1998[3] (Vera and Hanks 2004). Since hemp's re-emergence, production levels have been inconsistent (Chaudhary 2005). These inconsistencies[4] have been attributed to varying factors, including recovering prices of other crops (Hanks 2008), the absence of hemp fibre processors (Chaudhary 2005), overproduction in preceding years, as well as complications with U.S. importation (Brook 2008). Canada's current state of industrial hemp farming and production is said to be one of resurgence and development (Agriculture and Agri-food Canada 2007). In 2007, there were 149 growers licensed for cultivation and 30 for breeding[5] in Canada (Brook 2008).

The *Industrial Hemp Regulations* (*IHR*), in accordance with the *Controlled Drugs and Substances Act*, have provided the legislative framework for the operation of the Canadian hemp industry since 1998 (*Industrial Hemp Regulations* 1998). Health Canada's Office of Controlled Substances is responsible for issuing licenses to take part in the activities permitted under the *IHR* (Health Canada 2009). Those approved for licensing are subject to a variety of stipulations contained therein, including: a minimum age of eighteen, criminal record checks for drug offenses, and a minimum one kilometre distance between farms and school grounds and/or public areas frequented by persons below eighteen years of age (*IHR* 1998). Also, the level of delta-9 tetrahydrocannabinol

(hereafter referred to as THC), the psychoactive ingredient present in hemp, is restricted by these regulations to a maximum level of 0.3% (*IHR* 1998). Since the *IHR* are governed by Health Canada through the Office of Controlled Substances, these regulations mark a critical point of differentiation between governing hemp and more common agricultural industries in Canada (Excerpts from the *IHR* most relevant to this study are presented in Appendix A). The level of control and associated constraints are valuable to consider when investigating factors influencing the development of this relatively new, growing industry.

The Ontario Hemp Alliance (OHA), in cooperation with the Canadian Hemp Trade Alliance and other industry stakeholders across Canada, has provided their assessment of the *IHR* through the Canadian Hemp Industry Review Project (CHIRP) (Hansen-Trip and Schiefele 2009). This project was published by the Ontario Hemp Alliance as part of an Agriculture and Agri-food Canada (AAFC) funding initiative called the Advancing Canadian Agriculture and Agri-food Program (AAFC 2009). Their findings were released in 2009 (Hansen-Trip and Schiefele 2009). Although it is stated in the report that "the regulations remain efficacious and largely acceptable," various suggestions for improvement are offered (Hansen-Trip and Schiefele 2009:6). One area outlined in the CHIRP as insufficient is the evaluation of which varieties (cultivars) of hemp are permitted for growth in Canada (Hansen-Trip and Schiefele 2009). It is recommended that plant breeders and other industry representatives be included in these processes, aiding in the evaluation of hemp varieties and the elimination of discrepancies over testing procedures (Hansen-Trip and Schiefele 2009). A second aspect of the regulations the CHIRP critiques is the requirement that hemp cultivation occur away from

school grounds, suggesting it is impractical and unnecessary, and promotes the negative notion that industrial hemp poses a danger to the public (Hansen-Trip and Schiefele 2009). Third, the CHIRP reviewed the impact of THC limitations, noting that multiple testing of THC content is "very expensive" (Hansen-Trip and Schiefele 2009:7) and stakeholders in Quebec consider these financial obligations "a barrier to new start-ups" (Hansen-Trip and Schiefele 2009:14). The CHIRP recommended a review of protocol related to testing, and the need to consider reducing requirements on THC testing (Hansen-Trip and Schiefele 2009). Finally, it is argued in the CHIRP that stakeholders in British Columbia see the minimum ten acre land size for grain and fibre cultivation as restricting a viable cottage industry there because the terrain in the province makes it difficult to abide by acreage restrictions (Hansen-Trip and Schiefele 2009). The CHIRP provides a useful investigation of current regulatory experiences, offering nation-wide insight on the impact current regulatory structures have on the operation and development of the industry. Focused on regulations, the CHIRP does not explicitly attend to other impacts on the industry or their connections to environmental sustainability. The analysis presented in this paper provides a more extensive assessment of forces impacting industry development and the environment by extension.

The regulations guiding the operation of the industry and evaluated by the CHIRP revolve around the perceived risk of growing hemp. Debate over growing industrial hemp comes largely from its association with marijuana, as both plants belong to the species *Cannabis sativa* and contain the psychoactive ingredient THC (Wang and Shi 1999). There are numerous ungrounded claims regarding the risk of industrial hemp farming, including the possibility of using hemp as a drug, or using hemp fields to hide the growth

of marijuana (West 1998). Additionally, the U.S. Drug Enforcement Agency contends the two plants "are indistinguishable and therefore should be controlled by the same law" (Wang and Shi 1999:344). Such claims, however, are without merit. Recent research on genome sequencing of *Cannabis sativa* has further exposed the differences between marijuana and hemp strains of the plant, as well as offering new routes for advancing hemp past regulatory structures by the potential removal of cannabinoids (which includes THC) from hemp cultivars (van Bakel et al. 2011). In terms of using hemp to hide marijuana, the two crops would not likely be grown together because the cross-pollination of the plants would diminish the crop qualities in both[6] (West, 1998). Additionally, the minimal THC content currently present in hemp varieties is too low to cause a psychoactive reaction, and the presence of a different chemical called cannabidiol (CBD) is posited to counteract the psychoactive effects of THC (West 1998). If the CBD to THC ratio is greater than one, and the THC content is below 1.0 percent, the plant is said to have no psychoactive effect (West 1998). This method is arguably a more thorough assessment of hemp's psychoactive characteristics, accounting for THC and a counteracting compound, CBD. Unfortunately, it is not currently applied in Canada's evaluation of hemp; only THC percentage is used for classification (see Industrial Hemp Technical Manual).

Ecological Sustainability and Industrial Hemp

Current literature indicates there are several environmental benefits offered by industrial hemp production when evaluated against similar crops and products (Bergoffen and Clark 1996; Burczyk et al. 2008; Halsey 1997; Kolosov 2009; Roulac 1995; Smith-Heisters 2008). The environmentally advantageous characteristics of industrial hemp farming[7]

include: soil remediation (Roulac 1997; Smith-Heisters 2008), soil ventilation (Roulac 1997; Vantreese 1998), contributions to disease control (Brook 2008), and suitability for crop rotation (Roulac 1997). Utilizing product-to-product and crop-to-crop comparisons further demonstrates the environmental advantages of hemp.

The environmental sustainability of hemp can be evaluated in comparison with cotton (clothing) and trees (paper products). Although the current availability of processing technologies may provide cotton the advantage over processing hemp (due to cost), it has been noted that hemp would have less impact on the environment than cotton (Smith-Heisters 2008). Hemp needs little or no pesticides and herbicides (Bergoffen and Clark 1996; Kolosov 2009; Roulac 1995; Smith-Heisters 2008), while cotton farming utilizes "vast quantities of herbicides, insecticides, fungicides, and defoliants" (Roulac 1997:170). Smith-Heisters (2008) outlines cotton's shortfalls in comparison to hemp, highlighting cotton's need for more inputs, three times more land, and twice the growth time. Hemp is also capable of making stronger more durable clothing than cotton (Kolosov 2009; Smith-Heisters 2008). Lastly, research has shown hemp (and flaxseed) to be more suitable than cotton for growth in, and the remediation of, polluted soil (Angelova, Ivanova, Delibaltova, and Ivanov 2004). Further research is needed to evaluate and compare the "full life cycle of textile products" from cotton, hemp and other resources, assessing the full impact these resources have on the environment (i.e., impacts during seed making, growth, processing, global distribution, length of use, recycling, and decomposition) (Smith-Heisters 2008).

Making paper from hemp is another notable illustration of how hemp can be used to replace less renewable resources, in this case trees. Industrial hemp has been used for

thousands of years for the production of paper and various other products (Rosenthal 1994 as cited in Bergoffen and Clark 1996). Notable environmental benefits in this sector include: more efficient carbon dioxide absorption than trees (AAFC 2007); a considerable reduction in deforestation; increased recycling and biodegrading properties of paper products (Roulac 1995; Smith-Heisters 2008); longer lasting paper products (Conrad 1994 as cited in Halsey 1997); improved soil quality during growth (Burczyk et al. 2008; Kolosov 2009); higher yield of pulp per acre; renewability as an annual crop (Halsey 1997); and lastly, a reduction in the use of chemicals and energy during processing[8] (Halsey 1997; Rosenthal 1994 as cited in Bergoffen and Clark 1996; Roulac 1995).

Valuable insight is gained by accounting for the various influences directing industry growth outlined above, including: inconsistencies in industry development, legal requirements, industry views as outlined by the CHIRP, linkages between hemp and marijuana, and the ecological benefits of hemp farming and hemp based products. The literature reviewed provides the necessary context for exploring the external structures and processes impacting the growth of the Canadian hemp industry in directions that will help curtail environmental degradation. As structural obstacles prevent the environmentally beneficially characteristics of hemp from being realized, factors which impact industry growth are in need of focused research. This study contributes to the small body of literature exploring hemp production in Canada, which heretofore has not included sociological or criminological analyses.

GREEN CRIMINOLOGY AND ECO-MARXISM

Green Criminology and eco-Marxism provide the conceptual grounding for this study. Green Criminology, with the use of eco-Marxism, provides the explanatory capacity

necessary to guide this study's analysis of structural obstacles impeding the development of the Canadian hemp industry in directions that help hemp's environmental benefits become realized. The Green Criminology perspective is appropriate in this context because it offers insight into social and ecological issues, seeking to identify acts posing significant environmental harm (White 2007). Moreover, Green Criminology offers a new interdisciplinary approach to analyzing harms against the environment, focusing on "understandings of context, culture, law, economics and science" (South 2007:243). This study draws on Green Criminology's ability to understand environmental harms using a variety of lenses. In describing Green Criminology, Nigel South (1998:212) refers to it as a "green perspective" applied in the field of criminology; a viewpoint which can adopt several different theoretical positions, "including Marxism, feminism, anthropology, functionalism or post-modernism", that are capable of analyzing environmental issues. In using the Green Criminology perspective, eco-Marxism is adopted to provide a lens which pursues "equitable and sustainable development" through a restructuring of economic rationalities (Leff 1996:154). Eco-Marxism is used here to examine industry productive processes and consider alternatives to supporting the political economic status quo (and thus environmental harm), as endorsed by advocates of ecological modernization.

Ecological modernization proposes a fusion of economically and environmentally sustainable development (Davidson and MacKendrick 2004; White 2003). Without placing constraints on the extraction of resources, it is an approach that attempts to improve the environment while expanding economically (Davidson and MacKendrick 2004). Modernizing the current capitalist[9] system, under this perspective, is expected to

curtail environmental destruction through increased efficiency in production processes (Foster 2009). Opponents point out, however, that increased efficiency leads to increased consumption, accumulation and expansion, which do not result in environmentally sustainable development (Foster 2009).

It is this paradox between production efficiency and environmental sustainability that ecological modernization fails to acknowledge (Foster 2009), creating what eco-Marxists refer to as contradictions. James O'Connor (1994) outlines two contradictions. The first stems from traditional Marxism, where profit-driven methods take exploitative steps to produce surplus and result in the unintended reduction of product demand (O'Connor 1994). In an effort to efficiently produce surplus for profit-making, steps like wage reductions and faster production speeds are taken, inadvertently reducing the "realized profits, or market demand" (lowered wages reduces workers' capacity to consume) (O'Connor 1994:160). In addition to this demand-side contradiction, eco-Marxists account for a second contradiction of capitalism, created on the supply side (O'Connor 1994). In this second contradiction the efforts made in pursuit of profits create a cost increase, as the conditions for production are neglected over time (O'Connor 1994). This means the materials and conditions used in production processes, for instance soil conditions, are neglected through profit seeking short-cuts, and become less able to offer the same capacity to produce surplus without added costs (O'Connor 1994). These contradictions are valuable for the analysis of Canada's hemp industry because they aid in elucidating capitalism's impact on environmentally sustainable production.

Change is needed from the narrow technological solutions of capitalism that merely stimulate further expansion and consumption, a phenomenon eco-Marxists refer to

as the *treadmill of production* (Foster 2009). This concept "describes capitalism as an unstoppable, accelerating treadmill that constantly increases the scale of the throughput of energy and raw materials as part of its quest for profit and accumulation, thereby pressing on the earth's absorptive capacity" (Foster 2009:48). It has been noted that Marx and Engels "wanted to organize and develop production to satisfy human need, while at the same time conserving the regenerating capacity of nature" (Vaillancourt 1992:60). This can be further explained as pursuing changes from profit-focused capitalist production (Foster 2009) towards "the improvement of the quality of life and the environment through a radical critique of needs" (Leff 1996:152). To pursue this change, eco-Marxism proposes "the elaboration of new concepts concerning an equitable and sustainable production process along with instruments for planning, controlling, and monitoring the environment" (Leff 1996:142).

A "*new productive paradigm*" is sought by eco-Marxists (Leff 1996:154), an alternative system of production that incorporates wider social and ecological relations and re-evaluates the way in which technologies are used (Foster 2009). A sustainable form of production will require changes at the social level, as the dismantling of nature's alienation is inextricably tied to social relations (Foster 2009). Social relations, in conjunction with natural conditions, impact how technologies are used, and which technologies are endorsed (Foster 2009). Alternatives may lie partly in changing social relations to foster social equality and cooperation as well as environmental sustainability. An environmentally sustainable system necessitates "a cooperative endeavour" to adequately manage natural resources (Burkett 1999:227). For instance, Eco-Marxism promotes political pluralism to expand participation in political decision making to the

rest of society, fostering greater involvement in the governance of natural resources (Leff 1996).

Within these alternatives, however, the accompanying limitations must be acknowledged. Burkett (1999) warns that "even with all efforts to increase, disseminate and apply knowledge about the environmental impacts of human production, a pro-ecological society will recognize that human knowledge regarding nature and the effects of human interventions therein can never be complete" (p. 226). Attention should focus on both the potential environmental impacts of human actions as well as our lack of available knowledge concerning the degree of these impacts. The Green Criminology literature illuminates the need to produce flexible alternatives that remain under continuous critique and evaluation (White 2007), as well as the need to understand the subjectivity of the "truths" provided in society (i.e., regarding what actions are 'harmful') (Halsey 2004). While seeking to adequately manage the natural environment the remaining uncertainties within that management must be acknowledged (Burkett 1999).

The perspectives of Green Criminology and eco-Marxism provide valuable insight on the relationship between environmental sustainability and larger social structures. In pursuing an equitable and sustainable production system, it is valuable to account for the contradictions inherent in capitalism, and the need for changes at the social level, especially regarding the capacity for involvement in political decision making and cooperative resource management. This study investigates how structural obstacles facing Canada's hemp industry impede development in directions that will help hemp's environmental benefits become realized. Green Criminology and eco-Marxism aid in

analyzing these obstacles, (re)defining them as environmental harms, and conceptualizing alternatives.

METHODS AND DATA

Interviews with members of Canada's hemp industry provide valuable data for this analysis. In-depth, semi-structured telephone interviews were conducted with members of Canada's hemp industry. This method was chosen to ensure the coverage of a predetermined set of questions and for its ability to delve deeper into valuable topics (Berg 2007). The central foci of these interviews were industry members' experiences with regulatory structures, labour processes, power relations, market and technology influences, and the environment. Each section of the interview was initiated with a general thematic question, with subsequent questions and probes used when needed to elicit further discussion (see Appendix B). Telephone interviews provided a means to reach participants in different regions of Canada in an efficient, cost-effective and timely manner. Telephone interviews may have further benefited the data collection process by reducing participation anxiety (Struges and Hanrahan 2004), as well as improving perceptions of privacy and confidentiality among interviewees (Greenfield, Midanik, and Rogers 2000).

Recruitment for participants proceeded after the study received clearance from the University of Windsor Research Ethics Board. Participants were recruited via email requests for volunteers, largely from the membership of the Canadian Hemp Trade Alliance (CHTA) and the Ontario Hemp Alliance (OHA). Additional participants were located via Internet searches and contacted individually over email[10]. A total of eleven interviews were conducted, averaging approximately 75 minutes in length. Each of the

eleven participants has been assigned a pseudonym to protect their identities, and are identified in this study by pseudonym and occupational category (e.g., Innes, farmer). The participants reside in five different provinces across Canada (British Columbia, Saskatchewan, Manitoba, Ontario and Quebec) and hold various roles within the industry, including farmers, breeders, processors, and entrepreneurs (namely related to food sales and processing), many of which performed a combination of these roles. Industry members operating in five of the six provinces that grew hemp in 2010 (see Chaudhary 2005) were interviewed (only contributions from Alberta were missing). The data acquired were analyzed using a series of coding procedures. Open coding was the initial step used to condense the data into common themes (Neuman 2003). This coding facilitated the development of consistent and extensive coding categories (Bogdan and Biklen 1982). Examples of open coding categories which were later combined into one focused code include: weed suppression, soil remediation, and deep root system. This step was followed by focused/axial coding, which allowed for the narrowing of specific topics around central concepts (Strauss 1997 as cited by Berg 2007; Lofland and Lofland 1995). Focused coding categories used in this analysis include: hemp's association with marijuana; the need for education; communication concerns; and experiences with the U.S. hemp market. These central concepts were further developed by organizing the coding categories into a data matrix. The matrix offered a framework "for the horizontal and vertical analysis of the interviews" (Bisschop 2010:354). For example, the second column in the matrix housed the coding category 'Association' (referring to hemp's association with marijuana) which sorted interviewee responses for this particular topic

into the eleven rows of the matrix. Using a matrix for data analysis provided "a simple, systematic, graphic way to compare and contrast data" (Bickman and Rog 1998:497).

Saturation was reached for several coding categories, as they developed depth (Corbin and Strauss 2008) and additional concepts no longer emerged during the final interviews (Holloway 1997). The coding categories that reached saturation include: hemp's association with marijuana; the perceived need for improved communication; the need for education; technology's influence; the influence of price and supply; the industry's capacity for growth; the usability of the licensing procedures; the adequacy of regulations; experiences with the U.S. hemp market; and experiences and viewpoints regarding environmental sustainability. These coding categories, organized into four central themes (negative perceptions; regulatory provisions; market, technological and economic forces; and environmental impacts), are the focus of the analysis presented in this paper. The coding categories examining power relations were not sufficiently developed to be considered saturated[11].

After the study's research findings were drafted, a member check was conducted, giving interviewees an opportunity to provide feedback regarding the accuracy and validity of the information released. Each participant was emailed a draft of the research findings and given 14 days to provide feedback. The entire member check process was conducted via email. Feedback was minimal and largely positive. Only one concern was raised, which was related to including experiences with acreage limitations. This concern has been addressed in this final product.

RESEARCH FINDINGS

Through the process of data analysis, four general themes emerged from discussions with eleven interviewees regarding their experiences within Canada's hemp industry. The four topics of focus are: (1) the impact of negative public perceptions on the industry; (2) regulatory inadequacies; (3) economic influences on market and technological experiences; and (4) environmental impacts influenced by the preceding themes. Each of these issues help guide a discussion of how structural obstacles facing Canada's hemp industry impede development in directions that will help hemp's environmental benefits become realized. Themes developed reflect combinations and overlapping aspects of several saturated coding categories. These four interconnected themes are each discussed in turn below.

Public Knowledge and Perceptions

Industrial hemp's inaccurate conflation with marijuana appears to be causing problems for Canada's hemp industry as nine interviewees volunteered varying experiences with hemp's association with marijuana and the negative impact it has on the industry. One respondent explained "an external factor would be the negative public image of hemp, I think that affects the industry quite substantially" [Jessie, farmer]. Kasey [farmer] explained how negative public perceptions impact the industry's ability to attract investment if businesses believe they "can't be associated with it [hemp]." Similarly, Ali [sales/business person] noted negative perceptions may cause "large conservative companies [to] stay away from hemp […] because they are worried about the connotations or associations it might have." Additionally, one interviewee argued that the mandatory minimum distance from schools [one kilometer] adds to the poor public image

of the industry [Emery, farmer, sales/business person], which is consistent with the positioned produced by the CHIRP (Hansen-Trip and Schiefele 2009). Potential avenues to curtail these perceptions were offered, including increased education and marketing.

Over half of the interviewees expressed a need for further education and increased awareness concerning industrial hemp, both inside and outside the industry. Two interviewees explained that affiliates responsible for industry regulation, such as samplers (the officials who collect samples for THC testing) would benefit from further education to improve communication with industry members, for instance with regard to collecting samples at the most appropriate time of the growing season. Also, Innes [farmer] discussed the lack of consumers who are even aware of hemp, as well as the need to educate "your growers, your local politicians [...] and bankers" to disassociate hemp from marijuana. The image of the industry may, however, improve in the near future. According to Cameron [farmer, sales/business person], the appearance of hemp in the media in connection with health food "goes a long, long way for creating awareness" of the products and the industry by extension. The use of marketing as a possible mechanism for increased education and awareness regarding hemp was discussed by two interviewees. In particular, Ali [sales/business person] noted that the industry needs to "manage its identity" and "manage its brand image."

Notable linkages were drawn between the poor image of hemp, the need for education, and the potential benefits of marketing (especially as a "health" and "green" product). The interviewees acknowledged the impact perceptions are having on the industry and this knowledge and associated suggestions need to become part of an increased participation in managing productive processes as called for by eco-Marxists

(Leff 1996). Further, an increase in educational and marketing techniques could contribute to "new strategies of social participation" (Leff 1996:154) for collaboratively managing environmental resources (Burkett 1999; Leff 1996). Strategies for increasing public participation in the management of industrial hemp are a critical step to dismantling the structural obstacles facing Canada's hemp industry which impede development in directions that will help hemp's environmental benefits become realized.

Regulations as Useful but Inadequate

Regarding the clarity and comprehension of the regulations and licensing procedures, nine interviewees considered the licensing applications to be sufficiently understandable overall, with one participant describing the regulatory mechanisms as a "very workable framework" and "not debilitating" [Cameron, farmer, sales/business person]. Of the remaining two interviewees, one had no personal experiences with licensing procedures and the other expressed discontent with the clarity and coherency of the licensing process, specifically in regards to the legalistic terminology utilized. In terms of specific industry requirements, two-thirds of the interviewees outlined specific regulatory shortfalls (regarding the *IHR* almost exclusively), all consistent with the CHIRP review of industry regulations (Hansen-Trip and Schiefele 2009). Important concerns raised include the minimum acreage restrictions, required amounts of THC testing, and disapproval with industry management under Health Canada. Potential solutions to the inadequacies within the regulations were also outlined.

The need to change the minimum 10 acre requirement to something less restrictive to small scale farming and experimentation was also acknowledged by participants. Emery [farmer, sales/business person] saw the land size requirements as preventing

smaller, “artisan” level experimentation, explaining changes to this restriction could offer valuable innovations using hemp materials. These types of restrictions contribute to reducing the capacity for industry growth in directions that will help curtail environmental degradation, for instance in the clothing sector. Concern raised over the requirement that hemp farmers test for THC even after testing has been done during breeding was consistent with the recommendations set out in the CHIRP. Four interviewees asserted that THC testing at the commercial growth stage and at the food processing stage is costly and unnecessary. One respondent explained that excessive expenditures are made yearly “to monitor and manage the THC in the industrial hemp […] even though, first of all, to be legally qualified as an industrial hemp variety, it [seed for that variety] has to be less than 0.3% THC” [Gabriel, farmer]. According to another interviewee, “for the THC to get out of line within one year […] of a multiplication, going from certified seed to a commercial crop, […] it’s really very unlikely” [Kasey, farmer]. This is an important point because growers are required to buy new certified seeds every year, and are not permitted to save seeds from crops grown from certified seeds to be used in subsequent crops. Each new season growers must buy tested seeds and then incur unnecessary additional costs when required to complete further testing. Hemp’s conflation with marijuana has consequentially created cost increases for the industry in terms of testing for THC as well as buying new seeds yearly. These added costs reduce incentives to growing hemp in Canada and pose limitations to industry development.

Problems communicating with Health Canada, especially regarding the lack of response to the CHIRP report, were articulated by four interviewees. Kasey [farmer]

commented that the CHIRP was “submitted to Health Canada and to date there hasn’t been any action on any of it.” Health Canada’s inaction regarding this review of regulations is an important concern raised by interviewees, highlighting the lack of participation in political decision making by the industry. Disregard for the CHIRP means the recommendations developed from this project remain unacknowledged, like the desire to partake in the evaluation of which hemp cultivars are approved (Hansen-Trip and Schiefele 2009). Political participation is a characteristic identified by eco-Marxists as an essential component in making changes towards a sustainable and cooperative management of natural resources (Burkett 1999; Leff 1996). Increasing industry involvement in political decision-making could improve the management of hemp in directions that help hemp’s environmental benefits become realized.

Despite the difficulties with the regulations, the participants did not suggest radical changes and considered the regulations to be important. Blair [sales/business person] asserted that testing (for THC) “adds legitimacy since we’re fighting […] a global battle to get hemp food recognized.” Additionally, Kasey [farmer] explained regulating hemp is helpful in maintaining its “distance from marijuana.” These experiences are indicative of a reliance on regulations to substantiate the industry legitimacy, an important view point since many regulations were cited as inadequate by interviewees and in the CHIRP. A useful pattern to identify between the recommendations highlighted in the CHIRP, and those offered by interviewees, is the subtlety of the suggested amendments to the current system. Not only did interviewees acknowledge the utility in having licenses and regulatory mechanisms, but the recommended changes do not endorse any radical restructuring or dismantling of the regulatory system.

In discussing alternatives to current regulatory mechanisms, five interviewees expressed the need for a shift towards more agriculturally-based regulatory mechanisms. They explained that Health Canada's governance and jurisdiction over Canada's hemp industry needs to be diminished, at least to some degree. Blair [sales/business person] noted that the industry "should be handed over to Agriculture and Agri-food Canada," while Hayden [farmer, sales/business person] explained that "hemp should be regulated just like wheat, oats or barley." Affirming these opinions, a third interviewee highlighted hemp's exclusion from the *Canada Grain Act*, and argued that there are "certain rights and privileges that are granted to grains under the Act, that hemp does not have" [Kasey, farmer].

Potential benefits from switching to an agriculturally-based governing body involve not only attending to regulatory concerns raised in this study and by the CHIRP, but an opportunity to diminish the drug associations Health Canada perpetuates through regulating hemp under the same office (Office of Controlled Substances) as illegal drugs [Kasey, farmer]. These associations illuminate the ways in which social structures dictate what is considered harmful and how these harms are managed (White 2002). In this case, hemp remains attached to drug associations and is managed as such; something management under AAFC may change. Additionally, AAFC may offer new ways for monitoring and managing environmental resources, as sought after by eco-Marxists (see Leff 1996), by linking the industry to an agriculturally-based form of governance. The benefits of switching governing bodies and being afforded the status of a Canadian 'grain' can be further illustrated by comparing the regulatory structures of industrial hemp and flaxseed. Five interviewees cited flaxseed as a competitor of hemp in the food

market, and flaxseed's similarities with hemp set up a useful comparison in terms of agricultural regulation in Canada. This comparison of governing bodies is presented in the Discussion section of the paper.

Economics, Technology and the Market

The size of Canada's hemp market is currently viewed as marginal in comparison with more popular crops – a feature acknowledged by four interviewees. All interviewees, however, recognized the potential of the industry to develop further. Potential was recognized for both the grain and fibre sectors, with the latter being greatly contingent upon further technological investment and development. One interviewee explained that the processing of fibre requires "tremendously technical and complicated technology" [Gabriel, farmer]. Various factors are impacting industry development, many of which hinge on economic circumstances. From an eco-Marxist perspective this is problematic because the development of the fibre industry hinges on its perceived profitability, while relationships with social and ecological sustainability are disregarded (Foster 2009). Moreover, the potential for the application of hemp fibre to direct industry growth towards replacing products made from non-renewable resources is deprioritized largely due to economic considerations.

The development and maintenance of Canada's small, but growing hemp market reacts to the unique restrictions on available supply and price of hemp seeds (raw material for growth), as well as the prices of the more commonly grown Canadian crops hemp competes with. Seven interviewees stated the industry is currently being impacted by an insufficient supply of seed. One respondent explained that the current seed supply has been reduced to dedicate more acres to the breeding of hemp varieties (cultivars) at stages

prior to pedigree status [Finley, sales/business person]. Another interviewee raised concern over being restricted to buying and growing only pedigree seed even when there is no supply, and there is supply of non-pedigree seed [Hayden, farmer, sales/business person]. In regards to seed prices, five interviewees explained that the current price of hemp seed is high in comparison with common grains like wheat. The high price of hemp seed limits current demand, according to Kasey [farmer]. Price and supply of, and demand for hemp seeds were three interrelated factors affecting the industry. This is a critical point in relation to market development: industry members experience pressure in making economically judicious decisions, and the availability and price of seed impacts this decision-making. The *IHR* are responsible for the restrictions on growing only THC tested, pedigree status seeds, and limiting who can be licensed to grow hemp (concerning land size and distance from schools and young persons) which further impacts seed demand, supply and price.

The internal functioning of the hemp industry regarding the relationship between growers and processors is also important for the sustainable growth of the industry. The equitable distribution of profits between growers and processors is a valuable factor to consider in terms of industry growth and incentives for farmers to grow hemp. Finley [sales/business person] expressed the importance of processors adequately compensating growers to ensure their return is at least equal to that of more commonly grown crops. This internal industry problem in which processors were taking "a disproportionate share" was highlighted as a damaging reality within the industry. The equitable distribution of profits is a critical component for the industry to consider in the pursuit of equitable and sustainable productive processes endorsed by eco-Marxism (Leff 1996). In addition,

based on O'Connor's (1994) articulation of the first contradiction of capitalism, profit motivated short cuts like the inadequate compensation of growers from buyers of raw material is part of a larger trend of diminishing the demand for products. Although processors are impacted by the same and/or similar financial constraints as hemp farmers, avenues to ensure fair compensation to farmers and processors are vital to the continued interest in, and development of, Canada's hemp industry.

The hemp market in Canada is also largely dependent upon exportation to the U.S., which accounts for a significant portion of Canadian hemp production. One farmer explained: "the Canadian market is an export market for hemp, […] we don't use all that we produce here in Canada", further estimating that "80% plus of what's produced in terms of hemp is exported" [Jessie, farmer]. Four interviewees offered accounts of the impact the U.S. hemp market has on the hemp industry in Canada, acknowledging that U.S. laws prohibiting hemp growth and permitting hemp importation have an impact on the growth and maintenance of Canada's hemp market. Interestingly, two diverging opinions were offered regarding the impact future changes to U.S. legislation may have. One grower feels the legalization of growing hemp in the U.S. "would really hurt our industry here in Canada" [Jessie, farmer], while Blair [sales/business person], who is experienced in business aspects beyond the farming stage, suggested the entrance of U.S. growers would have a "positive" impact, "help[ing] move hemp more into a mainstream market." It is possible that both study participants have valuable assumptions, as an adoption of hemp in American agriculture could cause a drastic increase in competition for Canadian farmers, but also popularize hemp and help develop it into a common North American crop. Respondents are aware of the industry's dependence on the U.S.'s

demands for Canadian hemp, but the potential impacts from changes to regulations in the U.S. are unclear. The uncertainty and dependency that results from linking Canada's hemp industry to the U.S. is illustrative of the considerable hurdles facing Canada's hemp industry. These types of hurdles can limit industry development, and consequently the actualization of hemp's environmental benefits. The risks of U.S hemp production in the future could be mitigated by the increased development of hemp technologies for fibre processing; a potential safeguard to protect Canada's hemp market while developing products and technologies that offer environmental benefits.

In an industry where "technology is king," [Hayden, farmer, sales/business person], it is valuable to explore the current experiences industry members are having with farming equipment, processing machinery and other technology. Although advancements in farming and processing technologies may assist the industry's expansion, possibly in directions that benefit the environment, the reliance on technology for mitigating environmental harms is opposed by eco-Marxists (Foster 2009). Eco-Marxism is utilized in this study to move past narrow technologically-focused strategies which depend on profit and economic expansion (Foster 2009). All interviewees offered explanations of technology's importance within the industry. Hayden [farmer, sales/business person] described harvesting as "difficult", explaining that it is "hard on the equipment and requires modification and some expertise." He further explained that some "good farmers" end up no longer growing hemp because the profit is not worth the abuse their equipment goes through. Three farmers discussed the significant height of hemp as a problem for harvesting; two of these farmers explained how growing shorter varieties increased the ease of harvest, but that it is only an option when growing for

grain. When farming for grain, shorter varieties can be used so that the height of the hemp is similar to that of other crops and is "within the normal operating spectrum for standard agricultural equipment" [Kasey, farmer]. Kasey [farmer] explained that if hemp is grown for grain and fibre, then taller varieties are desirable (for higher fibre yields), causing problems for standard equipment. This solution of growing shorter hemp for ease of harvest restricts the growth of the fibre industry (and paper and clothing applications as a result), which is an underdeveloped sector of Canada's hemp industry.

The technological gap between the grain (food) and fibre industries can be attributed, in part, to inaccessible fibre processing technology. Blair [sales/business person] remarked that "the fibre sector […] is just waiting for decortication facilities." Processing hemp fibre is said to require "tremendously technical and complicated technology" [Gabriel, farmer]. Complicated technology and high costs contribute to a lack of potential buyers to initially process hemp fibre to be used in applications like cement [Innes, farmer]. Thus, although hemp fibre is thought of by interviewees as having a potential market, expensive machinery and complicated processing methods cause interested buyers to seek fibre material at very low costs (or pursue alternative fibre sources), reducing incentives for hemp farmers to sell their fibre. One farmer remarked: "you can't go take that fibre off the field at the price that the fibre guys want it for and not lose money" [Finley, sales/business person]. Another study participant remarked on the absence of "factories that are willing to take hemp fibre to turn it into anything" [Emery, farmer, sales/business person]. Two interviewees explained that a lack of efficient means to remove the fibre from the field leads farmers to burn the fibre (left over from producing grain) as a more economical practice than selling it.

The lack of fibre processing infrastructure and the burning of fibre is an unfortunate circumstance of current market and technological developments that impacts the ecological (and possibly the economic) sustainability of Canada's hemp industry. From an eco-Marxist perspective the lacking developments in the fibre sector illustrate the importance of critiquing societal needs and reorganizing production processes to improve quality of life and preserve the environment (Leff 1996; Vaillancourt 1992). Eco-Marxism calls for a more sustainable production system in which environmental impacts, such as burning fibre instead of using it to replace paper and clothing, are added to decision making practices (Leff 1996). The capacity of the fibre sector to foster industry growth in directions that will help curtail environmental degradation (e.g., replacing tree-paper with hemp paper) is an import factor to incorporate into political-economic decision-making regarding policies and provisions that could stimulate the fibre sector. Products and technologies which use hemp to replace non-renewable resources (i.e., hemp paper) need to be recognized and supported by the government to push the growth of the Canadian hemp industry in this direction.

Environmental Sustainability

Gainful insight was offered by interviewees regarding the environmental sustainability of current industry products and processes, often drawing linkages to economic considerations. Interviewees were asked for their own definitions of environmental sustainability. Their definitions included: low inputs into soil (herbicides, pesticides and fertilizers), zero waste, improving the land, being 'natural' and not genetically modified and providing benefits to the environment in general. Emery [farmer, sales/business person] explained that to be "truly sustainable" means being "sustained through […]

generations and generations forever", and also noted this conception would necessitate a "post-petroleum" agriculture that may still utilize machinery, but use alternative fuels.

Almost all respondents attested to the positive environmental characteristics of hemp. The interviewee who dissented, Finley [sales/business person], offered experiences related to processing and selling hemp products and was concerned with the unsustainable way hemp is transported long distances for processing. It was noted that for hemp processing to be sustainable it needs to occur in the region it is grown, and not moved from one spot to another for cleaning, processing and packaging. As an industry member with no farming experiences, Finley's [sales/business person] perception of hemp's environmental impact is limited to entrepreneurial experiences. Specific environmental benefits detailed by interviewees include hemp's ability to grow without the use of "herbicides" or "pesticides", offered by both Emery [farmer, sales/business person] and Gabriel [farmer]. Also, three respondents acknowledged hemp's ability to suppress weeds. Further, Cameron [farmer, sales/business person] remarked that hemp is "quite tolerant in marginal soil conditions" and that "the deep tap root goes a long way to aerate the soil." Overall, interviewees expressed very positive experiences and perceptions regarding the environmental sustainability of industrial hemp.

The interviewees' understandings of environmental sustainability conflict with perceived economically sustainable farming and production practices. Six interviewees made links between economics and the environment, citing the importance of prioritizing the economic feasibility of environmentally sustainable practices. These constraints are typical of capitalist production systems eco-Marxists argue against, as the prioritization of profit leaves critical issues (like the renewability of a resource) disregarded (Foster 2009).

Cameron [farmer, sales/business person] discussed how “capital requirements” impact choices regarding entering the fibre or grain sector, explaining the choice to enter the hemp food (grain) industry was “because it was a low capital requirement to get started up.” As noted above, economic barriers restrict the growth of the hemp fibre sector. These barriers in turn limits industry growth in directions that will help hemp’s environmental benefits become realized, for instance through the production of hemp fibre for paper or clothing applications.

Framing the development and application of technology around capitalist drives toward profit is opposed by eco-Marxists in pursuit of more socially and ecologically sustainable relations of production (Foster 2009). When asked what constrains industry members’ abilities to act in an environmentally sustainable way, one interviewee remarked that fiscal considerations are a constraint, and that choices are determined by “what options are available and doable economically” [Emery, farmer, sales/business]. Another respondent, who commented on the environmental benefits of hemp, asserted that Canada’s hemp industry is not completely environmentally sustainable because of its reliance “on outside inputs [fertilizers] for fertility, nitrogen in particular”, further explaining that “for financial profitability, we have to have those outside resources [fertilizers] put in, to grow a crop that is worthwhile” [Gabriel, farmer]. O’Connor’s (1994) second contradiction is apparent in the industry’s dependence on fertilizers for profit, creating an unavoidable cost increase as the natural soil conditions are incapable of maintaining the yields a profitable crop demands. This eco-Marxist based contradiction outline how hemp production in capitalism actually “threatens its own profitability” and exploits workers and the environment in the process (O’Connor 1994). Economics has

such an impact on farming practices that, as Gabriel [farmer] explained, for environmentally sustainable production to occur the definition of profit would need to be "restructured to fit within the […] self-sustaining concept." This idea reflects the eco-Marxist vision of a "*new productive paradigm*" restructured from the "dominant economic rationality" of capitalism (Leff 1996:154). The pursuit of profit (as it is currently defined) in the current mode of production may be restricting the environmentally beneficial characteristics of hemp from being realized. A dependence on profits ultimately places restrictions on decision-making. Thus, based on the views of the interviewees, it appears that an environmentally sustainable industry is only attainable to a certain degree, unless changes are made to the perceptions of hemp, the way it is regulated, and the mode of production in which it is produced.

DISCUSSION

In considering the experiences offered by study participants, the question that results is: What strategies for industry development are needed? Moreover, it is valuable to explore which strategies help remove structural obstacles impeding the realization of hemp's environmental benefits. Negative public perceptions, regulatory inadequacies, economic influences on market and technological experiences, and environmental impacts are interrelated factors that impact the direction and pace of industry development. This study demonstrates that these interrelated factors are environmentally harmful because they limit the accessibility of hemp's environmental benefits. Building upon the information gathered from the study participants, the following strategies to promote environmentally beneficial industry growth are proposed: increase education and marketing; alter the industry's governance structure from Health Canada to management under Agriculture

and Agri-food Canada (AAFC); and increase government recognition and support[12], for example through business grants.

Theoretically, these strategies can be conceptualized as falling along a continuum between two polar perspectives on how to address environmental harm: ecological modernization and eco-Marxism. This continuum is used here to arrange the activities governing natural resources based on their ability to benefit/preserve the environment for subsequent generations. Ecological modernization focuses environmental strategies on technological efficiency and continued economic development (Davidson and MacKendrick 2004), while eco-Marxism pursues a revolutionary-like upheaval of both economic-centered rationalities (Leff 1996:154) and dependencies on new technologies to maintain the environment (Foster 2009). For the purpose of this study, strategies offered through a lens of ecological modernization are considered somewhat useful first steps which can be expected from within the industry (businesses, farmers, etc.) where profit is necessary for sustaining a business and/or a living. This study conceptualizes potential change through the movement of strategies forward along the continuum (towards eco-Marxism) by restructuring the system towards a cooperative management of natural resources (Leff 1996). As potential strategies will range from conservative (ecological modernization) to more radical (eco-Marxism), a combination of various alternatives may be necessary for Canada's hemp industry to significantly benefit the environment. The alternatives detailed below offer steps toward a "*new productive paradigm*" which conceptualizes ways of incorporating the industry and civil society in the management of industrial hemp, as well as changing accounting methods to include valuations of social and ecological sustainability (Leff 1996:154). The strategies offered below are directed at

the specific forces impacting the hemp industry uncovered by this research (e.g., negative perceptions) and highlight potential avenues for the realization of hemp's environmental benefits.

Largely in response to the negative perceptions surrounding hemp's association with marijuana, the need for education and improved marketing techniques were cited by study participants. This strategy can be viewed as lying closer to the conservative end of the continuum (towards ecological modernization), working to advance environmentally sustainable technologies and products within the current capitalist system. Canadian hemp organizations like the Canadian Hemp Trade Alliance may contribute to the re-branding of hemp through educational campaigns directed at potential end-users of hemp products, potential investors, and the public in general (Brook 2008). The use of various Internet-based educational and promotional techniques have been identified as potential avenues for increasing the awareness of hemp's benefits, as well as safety and market opportunities (Brook 2008). Internet-based approaches may include the use of webcasts which could offer "an opportunity to communicate technical information via a controlled, inter-active and focused educational message to a large targeted audience" (Brook 2008:43). Internet-based campaigns, as well as the use of other media outlets (television, radio, newspaper, magazines) offer a means to access information regarding Canada's hemp industry and hemp-based products, and educate the audience reached. As Canada's hemp industry is currently dominated by the grain sector, more specifically food-based applications, marketing and education related to health foods offer a significant opportunity to advance the industry. Fibre-based applications also offer tremendous marketing potential given the notable environmental benefits of hemp fibre-based

products. In addition to altering perceptions, education and marketing should be seen as connected to industry lobbying for both regulatory changes and private/public investment. As the various problems facing the industry are interrelated, so are the strategies to address them. Changing perceptions is linked to pursuing change in legislation, and legislative changes will impact public perceptions; thus, strategies must be sensitive to the interconnections between the problems being faced.

Another valuable route for improving the perceptions of hemp is linked directly to improving the regulatory structure of the industry. A shift from Health Canada as the governing body of the industry to an agriculturally-based governing body like AAFC is proposed. This strategy can be viewed as moving more towards the eco-Marxist end of the continuum, offering developments towards a more equitable and cooperative management of natural resources (Burkett 1999; Leff 1996), yet not disrupting the capitalist structure. As industrial hemp is excluded from the governing processes and regulatory provisions shared by other Canadian 'grains' (as detailed below), the current governing system of hemp can be viewed as inequitable, and lacking in many other regards (e.g., participation in approving hemp varieties). Since it is also evident that industry communication with Health Canada is inadequate, illustrated by the lack of attention given to the CHIRP, improvements can be made so that the hemp industry is governed more democratically. Thus, governance through AAFC, including classifying hemp as a 'grain,' would entail a more equitable governance of hemp in relation to other agricultural sectors (detailed below), address various regulatory concerns within the industry (i.e., industry involvement in, and communication with the regulatory body), as well as improving the image of hemp in the process.

Governing hemp in the same manner as other grains would ensure equitable access to various governing provisions, and the association of hemp with other grains (like flaxseed) instead of with controlled substances (like marijuana) would improve its image. Industrial hemp and flaxseed have similar food applications and compete with one another in the marketplace; however flaxseed is actually designated as a 'grain' and afforded the provisions provided by this inclusion. The *Canada Grain Regulations* designate several seeds, including flaxseed, as 'grain' for the purpose of the *Canada Grain Act* and the *Canada Grain Regulations* (*Canada Grain Regulations* 2011). AAFC is responsible for the *Canada Grain Act*, which is upheld by the Canadian Grain Commission (CGC), a federal government agency that regulates and certifies Canadian grain (AAFC 2010; Canadian Grain Commission 2011). For designated 'grains,' the CGC provides various provisions, such as quality assurance and financial security protection (CGC 2011). Since hemp and other grains (e.g., canary seed and quinoa) are not designated as 'grains', they do not benefit from such provisions. Services offered by the CGC include access to "additional documents that attest to specifications for quality factors, variety composition, and safety factors" (CGC 2011). If the industry was reassigned to the management jurisdiction of AAFC, the impact Health Canada and the Office of Controlled Substances have on the image of hemp would be abated. Eco-Marxism outlines the need for "productive processes that are equitable and sustainable" (Leff 1996:139) and governance through AAFC could facilitate this change by offering the industry the same services and provisions as the grains it competes with in the market place (e.g., flaxseed).

Employing educational and/or marketing initiatives developed by industry members, as well as switching governing structures to AAFC, would be useful steps in giving industry members increased participation in the management of industrial hemp in Canada, consistent with eco-Marxist demands for increased participation in decision making processes (Burkett 1999; Leff 1996). Strategies to help the industry progress in an environmentally sustainable direction should seek increased industry and public participation in the governance of hemp through a multitude of mechanisms. Such mechanisms include educational campaigns and marketing techniques to aid in managing the identity and acceptance of industrial hemp. Additionally, improvements to the regulatory structure may have a direct influence on the industry's participation in decision-making processes. The CHIRP acknowledged the need for industry participation in the evaluation of which varieties (cultivars) of hemp are permitted for growth in Canada (Hansen-Trip and Schiefele 2009). Interviewees identified the lack of attention the CHIRP received as limiting the voice of the industry. The AAFC funded the CHIRP through the Advancing Canadian Agriculture and Agri-food Program (AAFC 2009), and it is therefore likely that if AAFC were assigned as the governing body for the industry the CHIRP report would be taken seriously.

Although positive change may be pursued through education and marketing, and/or governance through AAFC, the integration of new economic assessment methods is an important eco-Marxist strategy to incorporate in pursuing an environmentally beneficial industry. For instance, accounting for the renewability of a resource as an investment incentive would require government recognition and support of the industry's potential value to the environment. In challenging the political economic status quo,

strategies to aid the industry in overcoming a lack of investment and government support (e.g., industry funding that prioritizes environmentally beneficial products) can be conceptualized as lying much closer to the eco-Marxist end of the continuum and further away from ecological modernization strategies. Government support of environmentally beneficial technologies and services is a valuable strategy for moving the industry closer to a "*new productive paradigm"* (Leff 1996:154) and expanding the conceptualization of technology's uses past an economic focus (Foster 2009).

Government recognition and support may come from varying techniques and provisions such as environmental policies and business grants. A carbon tax and a cap and trade system with carbon credits are two policy initiatives cited by the industry as having potential benefits for hemp products in the market place (Brook 2008). These types of policies have been highlighted by Canada's hemp industry because of the advantage hemp based products have over comparable fossil-fuel based products (Brook 2008). As of 2008, government support for the industry was reportedly miniscule (Brook 2008). Additional contributions have been made by the federal government to the industry since 2010 but have focused mainly on building facilities and purchasing new processing technology related to the food sector (Government of Alberta 2011). Recent investment by the Province of Manitoba, however, may illustrate more environmentally beneficial change. The provincial government contributed resources for developing processing technology to a business producing insulation and animal bedding made from hemp (Government of Alberta 2011). If Canada were to increase its financial and political endorsement of the environmentally beneficial aspects of the hemp industry (like using hemp insulation to replace fibre-glass insulation) hemp could become established as an

economically rational crop to grow and could stimulate a socially and ecologically sustainable industry.

Although dominant views of capitalist production processes are challenged in this study, the above strategies (educational and marketing campaigns, a switch from Health Canada to AAFC, and increased government support) do not challenge the current system in which industrial hemp is a licensed agricultural crop and governed through a variety of regulations. Radical changes like promoting the legalization of marijuana to advance the image and deregulation of industrial hemp are carefully avoided in recognition of the problems that may develop, at least initially, with such changes. Promotion of the legalization of marijuana by the hemp industry could just further fuel the conflation of hemp and marijuana. An upsurge in legal marijuana farming would also cause new problems linked to cross-pollination and the legalization of marijuana in Canada would further widen the regulatory gap between Canada and the U.S., potentially disrupting Canada's current hemp exportation market. As interviewees acknowledged, there is value in having the industry regulated and licensed, thus the strategies conceptualized through the interview data to implement environmentally beneficial directions of industry growth are not aligned with the dismantling of current regulatory structures or promoting the legalization of marijuana.

Strategies at the eco-Marxist end of the continuum of environmental strategies are beyond what the interviewees and recent literature on hemp production in Canada have suggested. However, a brief discussion of what a *new production paradigm* (Leff 1996) would look like in relation to the hemp industry is warranted. The eventual intended result of eco-Marxist strategies is a revolutionary transformation of the capitalist system

towards an egalitarian management of resources (Foster 2009). Central to this transformation is an assessment of the needs of society (Foster 2009). It entails a move past the constructed needs established by the capitalist market to the "genuine needs" of current and future societies (Foster 2009:273) in an attempt to neutralize the *treadmill of production* (see Foster 2009). Within this new paradigm industrial hemp and other renewable resources could replace non-renewable resources across the globe, as environmental sustainability and genuine need instead of profit would become the bases upon which production decisions would be made. Needs and wants would become realigned, and consumption would be managed based on its impact to future generations. This radical transformation is a necessary but complex task, and the strategies offered in this study are conceptualized as small steps towards this transformation. This transformation is seen as a necessary change to sustain the conditions of the environment for future generations.

The strategies proposed herein would require continuous evaluation, as discussed in the Green Criminology literature (e.g., Halsey 2004). Although tenets like technological efficiency and economic profitability found in ecological modernization may mirror the initial stages of the strategies suggested here (i.e., marketing and investment), these strategies must be flexible, and continuously redirect industry advancement in a direction that helps in the realization of hemp's environmental benefits. Environmental strategies should be carefully designed so that they do not simply contribute to the *treadmill of production* critiqued by eco-Marxists (Foster 2009). It is important to make sure that current and future marketing and educational campaigns, regulatory changes and government investments do not merely stimulate the treadmill-

like depletion of resources through a capitalistic drive towards profit accumulation (Foster 2009). It is essential that strategies endorsing environmentally beneficial directions of industry growth be molded around the deprioritization of profits, and the necessity for an equitable and cooperative management of natural resources like industrial hemp (Burkett 1999; Leff 1996), even if these shifts are only incremental.

It is anticipated that the strategies developed in this study will aid in the realization of hemp's environmental benefits. First of all, marketing and educational campaigns could provide strategies for social participation in the economic and political governance of resources (in this case hemp) (Leff 1996). Internet-based educational and marketing techniques may offer a new strategy for the industry to network about industry concerns and provide valuable and educational information about hemp. Second, being governed like the grains it competes with may offer the hemp industry a more equitable production system, as well as attend to regulatory concerns, like the recommendations proposed by the CHIRP. Finally, government investments in environmentally sustainable technologies and products could aid in the integration of "new indicators of sustainability into economic accounting methodologies" (Leff 1996:142). These strategies all relate to the larger need to reposition the environment within our current political economic system and to problematize environmental harms. As structural obstacles impeding hemp's environmental benefits from being realized are (re)defined as harms against the environment, strategies for dismantling these obstacles can become part of the sustainable and equitable management of industrial hemp in Canada.

ENDNOTES

[1] 'Sustainability' in this study is applied based on the definition of sustainable development offered by the Brundtland Commission: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations Commission on Sustainable Development 2007:1). Further, sustainability is understood in this study to be a relational concept, as many products and technological processes may not be environmentally neutral, but can be seen as relatively more sustainable when compared to other products/processes.

[2]In this study, *Canada's hemp industry* refers to the farming and processing of industrial hemp as well as the production, marketing and distribution of hemp-based products. Farmers are licensed for cultivation and breeding. The term *industrial* is used to refer to hemp grown commercially, and was adopted to clarify hemp's distinction from marijuana (Hansen-Trip and Schiefele 2009).

[3] The production of hemp dissipated in North America in the 1930s after legislation in the United States and Canada deemed hemp a controlled substance (Brook 2008). Industrial hemp production was encouraged by the government during the Second World War to produce materials like fibre and oil, but following the war regulatory changes and competition from other resources diminished the production of hemp until its disappearance in 1958 (Brook 2008).

[4] A drop in hemp production levels can be attributed in part to the increased profitability of competing crops due to new demands for grains used in ethanol production (Hanks 2008). Also, complications due to the banning of hemp exports to the U.S. caused a drop in demand for hemp (Brook 2008). Demand changed again however, when a successful court case reopened exports to the U.S. in 2004 (Brook 2008).

[5] Breeding is defined for the purposes of this study as the practice of propagating specific industrial hemp cultivars to produce pedigree seed in for growers.

[6] *Cannabis* grown for marijuana (high in THC, low in CBD) needs to be kept geographically distant from *Cannabis* grown for hemp (low in THC, high in CBD), and vice versa, because cross-pollination caused by pollen traveling great distances would diminish the crop quality of both plants, changing the purity of the variety being grown or bred (West 1998).

[7] Hemp is capable of improving yields through ventilating the soil (Vantreese 1998) and improving soil conditions by removing heavy metals from contaminated soils (Smith-Heisters 2008). Also, when used in rotation with more common (traditional) crops, "industrial hemp has the potential to disrupt traditional crop disease cycles" (Brook 2008:18).

[8] The chemicals and energy necessary to remove the lignin (plant glue) from the raw material and then whiten the paper are reduced because hemp is naturally whiter and contains less lignin than wood pulp (Halsey 1997; Rosenthal 1994 as cited in Bergoffen and Clark 1996; Roulac 1995).

[9] This study adopts an understanding of capitalism from Foster (2009), who contends that "[c]apitalism as a world economy, divided into classes and driven by competition, embodies a logic that accepts no boundaries on its own expansion and its exploitation of its environment."

[10] Additional participants were located through Internet searches for Canadian industrial hemp farmers, processors and business persons who made their email contact information publically available. Industry members identified through these searches were emailed a recruitment letter requesting participants for a single interview.

[11] Too little was offered by participants on the subject of power relations, possibly due to misunderstandings in question wording. The general thematic question used to explore power relations (see Appendix B) did not facilitate a discussion of experiences related to power influenced over the industry by external actors and structure. A more gainful discussion may have developed by asking: Describe the level of power you feel your role within the industry affords you. Further research would benefit from a detailed investigation of power relations experienced within Canada's hemp industry.

[12] Exportation to the U.S. makes up a significant portion of Canada's current hemp industry. Therefore, governmental incentives provided to the industry (such as grants and/or subsidies) will necessarily have to consider relevant national and international legal obligations to ensure these incentives do not infringe on any trade laws.

APPENDICES

APPENDIX A

Excerpts from the *Industrial Hemp Regulations*

Listed below are direct excerpts of the specific segments of the *Industrial Hemp Regulations* (1998) that are relevant to this study. Pertinent regulations are as follows:

SECTION 2

(1) These Regulations apply to

(*a*) the importation, exportation and possession of industrial hemp;

(*b*) the production, sale, provision, transport, sending or delivering of industrial hemp; and

(*c*) an offer to do anything mentioned in paragraph (*b*). (P. 2)

SECTION 9

(2) The Minister shall refuse to issue a licence or authorization in the following cases:

(*a*) if the applicant will have any single area of less than four hectares (10 acres) of industrial hemp under cultivation for viable grain or for fibre;

(*b*) if the applicant will have any single area of less than 0.4 hectare (1 acre) of industrial hemp under cultivation for seed, unless the applicant is a plant breeder;

(*g*) if the applicant or, in the case of a corporation, cooperative or partnership, any of its officers, directors or partners, as the case may be, has a criminal record

that includes within the previous 10 years

i. a designated drug offence, or

ii. if he or she ordinarily resides in a country other than Canada, an offence that if committed in Canada would constitute a designated drug offence;

(*i*) if the applicant or, in the case of a corporation, cooperative or partnership, any of its officers, directors or partners, as the case may be, is less than 18 years of age. (P. 8-9)

SECTION 36

No person who holds a licence to cultivate industrial hemp shall cultivate it within one kilometre of any school grounds or any other public place usually frequented by persons under the age of 18 years. (P. 17-18)

SECTION 39

(1) The Minister shall designate a variety of industrial hemp as an approved cultivar for a region if

(*a*) it is a variety of hemp that is recognized by the Canadian Seed Growers' Association, the Canadian Food Inspection Agency or the Organisation for Economic Co-operation and Development; and

(*b*) the Minister has reasonable grounds to believe that the cultivar is likely to produce a plant that will contain 0.3% THC w/w or less in its leaves and flowering heads when it is cultivated in the region of Canada for which it is to be designated.

APPENDIX B

Interview Questions

Knowledge About This Project:

Have you heard anything about this project before this interview?

Participant Profile:

General thematic question: Please tell me about your role in the hemp industry

1. How long, approximately, have you been participating within the hemp industry?
2. What is your current occupational role within the hemp industry?
3. How did you get started in the industry?
4. In your opinion, would you describe the business you are affiliated with as small, medium, or large scale?

Labour Process & Hemp Market

General thematic question: Are you aware of any external factors that affect the hemp industry?

5. Discuss your experiences with the industrial hemp market in regards to growth and demand.
6. Describe the role technology plays in terms of production experiences.
7. Considering your occupational role as a single step in the production process of a manufactured good, please describe the other stages before and/or after your role in the production process.
8. Do the products affiliated with your occupation face strong competition from other industries?

Power Relations

General thematic question: Do you feel that people in your role within the industry have a significant degree of power?

9. How does your occupational role position you to make changes in the industry?
10. What do you feel impacts the success and growth of the hemp industry?

Environmental Concerns

General thematic question: How would you define environmentally sustainable production?

11. Do you think Canada's hemp industry is environmentally sustainable?
12. Are you affiliated with the production of organic or non-organic hemp, or both?
13. Are there any pressures or issues within the industry that impact your ability to act in an environmentally sustainable way?
14. Is there anything that could be done to reduce the environmental impact of your occupation?
15. Where do hemp growers acquire the seeds from?
16. Are there presently any issues of genetic modification in the industry?

Licensing & Regulations

General thematic question: What is your opinion of the licensing and regulatory procedures within Canada's hemp industry?

17. Are the regulations easy for the average person to understand?
18. Are there areas in need of improvement?
19. Please describe the typical year-to-year experiences regarding the regulations and licensing?
20. Who enforces the regulations that license holders must follow?

Industry Changes

General thematic question: Have you noticed any changes in the industry in recent years?

21. Do you think Canada's hemp industry has the potential to grow further?
22. Are you aware of different policies on hemp used in other countries?
23. Do you think that hemp should be regulated like other agricultural products in Canada?
24. In your opinion, what is the most significant problem, if there are any, being faced by the Canadian hemp industry today?

Demographic Information

25. For demographic reference, could you please state your age, location within Canada, highest level of education achieved, and race/ethnicity identified with?

Conclusion

26. Do you wish to add any other information or voice any concerns in regards to your experiences within Canada's hemp industry?

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