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**A Proposal for the Political Economy of Green Criminology:
Capitalism and the Case of the Alberta Tar Sands**

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Key Words: Capitalism and Nature • Environment and Crime • Green Criminology • Karl Marx

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Abstract

Green criminology was proposed in 1990 to broaden the discipline and illustrate how environmental crime, deviance, and inequality can be interpreted through a critical lens influenced by political economic theory. Green criminology has yet to fulfill that theoretical promise. Instead, the political economic perspective on green criminology remains underdeveloped. The purpose of this work is to contribute to further development of a political economic green criminology by laying out the connection between ecological Marxism and green criminology. To carry out this task we describe five propositions that criminologists must consider when developing a green criminology from a political economic perspective. Importantly, these propositions suggest that the environmentally destructive forces of capitalism are opposed to nature. That is, we argue that green criminologists must come to recognize that capitalism and nature cannot both survive over the long run, and in criminological terms, capitalism is therefore a crime against nature.

Key Words: Capitalism and Nature • Environment and Crime • Green Criminology • Karl Marx • Ecological Marxism

Introduction

Green criminology focuses scholarly attention on the relatively neglected areas of environmental crime, law and justice.¹ Despite its popularity, green criminology is sometimes criticized for being antithetical to theory development as it narrowly examines environmental crime when more general theoretical explanations of environmental harm are needed (Gibbs et al. 2010).² While the study of green crime is rapidly expanding its theoretical orientation to deal with this critique, radical criminologists could do more to contribute to green criminology's theoretical development. To make that point, we draw upon existing ideas in the radical ecology literature to present five unifying propositions for a green criminology. These propositions focus on the relationship between the ecology and capitalism to help situate green criminology directly within a political economic context—one that draws upon broad explanations of environmental disorganization. To carry out this task we briefly review the ecological crisis of capitalism. Next, we examine five political economic propositions that can be used to ground green criminological analysis theoretically. We provide examples of these propositions using a current example of the kinds of ecological disorganization capitalism promotes, the tar sands development located in Alberta, Canada.

The Ecological Crisis of Capitalism

Radical criminology and its political economic roots are situated in the work of

¹ Importantly, this branch of criminology draws upon both the traditional crime and social harms approaches. The social harms approach was developed by Hillyard and Tombs (2007) and suggests that criminology look beyond legally defined crime to a variety of other forms of social harm. This expansion of criminology allows green criminologists to examine concepts such as 'ecological disorganization' and harm to 'non-human animals.'

² There continues to be a debate about the need for a 'green' criminology (e.g., one reviewer of this manuscript noted, 'do we really need to create a new criminology every time we confront a new empirical problem or changing social environment?'). Nevertheless it is clear that there is a rather large and growing literature in the area. For example, a Google Scholar search for the term "green criminology" produces thousands of citations.

Karl Marx (1842, 1867) and his observations concerning the importance of class, class relations and class conflict as a foundation for understanding capitalism. In addition to focusing on class analysis, we also refer to Marxist ecology positions (Burkett, 2009, Foster 1992; 2000; 2002; O'Connor, 1997, 1988). The result is a form of green criminology that highlights and integrates the material aspects of the intersection of criminology and ecology. This approach focuses attention on concepts such as natural capital and the relationship between capitalism and nature's economy. We also refer to descriptions of the intersection between the treadmill of capitalist production and ecological harm. The treadmill framework developed by Schnaiberg (1980) suggests that capitalism negatively impacts the ecological system through the use of chemically assisted, energy intensive production practices that damage the ecological system through the processes of ecological withdrawal and addition. This view is particularly relevant to understanding green crime within capitalist economies since WWII.

The globalization of the capitalist world economy (e.g., Wallerstein, 2004) is also relevant for describing the forms of ecological harm that the system produces. We are not the first to focus on the more general relationship between environmental crime and capitalism (Pearce and Tombs, 1998; Ruggiero and South, 2013; Stretesky, Long and Lynch, 2013a; White, 2002) or the association between capitalism and ecological harm (e.g., Clark and York, 2005; Foster 2000; O'Connor, 1997). However, rather than generalization about capitalism and ecological, this work specifically builds a political economic foundation for green analyses of crime. Thus, it is our intention to build upon previous research and demonstrate why radical ecology should occupy a more important place within green criminology. To do so we lay out five propositions relevant to that

association. These five propositions are not all the possible propositions that might be proposed about the relationship between capitalism and the environment, but mark a starting point for collecting together relevant propositions on that intersection.

The Political Economic Basis of Green Criminology

Proposition one – The accumulation of production related wealth is based on nature's labor. The social production of wealth is largely contingent upon the presence of the raw materials that have been produced in nature. Skirbekk (1994), for example, argues that raw materials provide the initial condition for the generation of surplus profit in a capitalist system (see also Burkett, 2009; Foster 1992, 2002; White, 2002). Simply put, without raw materials, production cannot occur because labor cannot produce something from nothing (see also Schneiberg, 1980). It might be argued that the accumulation of wealth under capitalism is merely a transfer of values produced by nature. Capitalism, however, ignores the cost of nature's labor and treats it as if it was a free commodity lacking reproductive costs (Burkett, 2009). The only cost to the capitalist when obtaining materials produced in nature is the investment in accessing those materials (e.g., rent on land for extraction rights, the cost of the technological machines to do the extracting; patents on nature's labor if needed to protect an investment). Capitalism does not allow the intrinsic value of raw materials to enter the economic equation. Thus, the cost of nature's labor that produces extractible resources is not considered a business cost. As an economic system, then, capitalism forces nature into an economic frame of reference that emphasises an alienated depiction and understanding of nature. White (2002:82) specifically notes,

At a more general level . . . denial is ingrained in the hegemonic

dominance of anthropocentric, and specifically capitalist, conceptions of the relationship between human beings and nature. Basic assumptions about economic growth and commodity production — central components of the dominant worldview — make it difficult for many people to see the essence of the problem as lying in the system itself.

Because capitalism imposes its productive relations over the productive relations of nature, green criminologists should consider redefining crime in a way that calls this 'theft of nature' into question (see Foster, 1999, who calls this an act of robbery). For example, Ruggiero and South (2013:7) make this point when examining the idea of green crime by noting that “GDP [a country’s income or gross domestic profit based on the production of all goods and services] does not adequately capture costs to the environment nor does it assess the sustainability of the growth that is occurring. In fact, GDP counts costs to the environment in a *positive* manner as officially these reflect enterprise, productivity and wealth” (emphasis added). As the authors suggest, “a full understanding of environmental crime requires an analysis of ... practices pursued by legitimate economic actors and political representatives.”

Canada’s tar sands (or oil sands) provide an excellent example of the way that legitimate actors use nature's labor to aid the accumulation of wealth. Oil sands or deposits of liquid bitumen mixed with sand and water, are a potential source of energy in several areas in the world, but are highly concentrated in Alberta, Canada where they are extracted to supply the energy used in the creation and transportation of products and services (Nikiforuk, 2010). Tar sands oil is created by nature through the process of

photosynthesis where nature converts the sun's energy into organic matter. This organic matter then undergoes changes through the process of diagenesis to create bitumen. While there is some disagreement as to how the oil sand was formed in Alberta, the end result is that the bitumen is mixed with sand, which makes oil in the sand more difficult to extract than conventional fossil fuels. Nature's labor, which creates the sand tars, is uncompensated labor, and the product of that labor is taken through ecological destructive mechanisms that destroy ecosystems and nature's reproductive abilities and labor, making the ecosystem less efficient and degrading ecological reproduction. What companies pay (e.g., permits to access to the sands, the machinery to extract the oil, processing and transportation costs, and royalties to the Canadian government) are capital costs of production, none of which are returned to nature as ecological improvement. Despite these costs, companies can make enormous profits from the oil sands. For example Bloomberg Business (Philips, 2014) reports:

Suncor Energy (SU) and Cenovus Energy (CVE) are two of the biggest oil sands producers in Canada. Both have profit margins that would be the envy of a lot of major oil companies. At Suncor, earnings before interest, taxes, depreciation, and amortization (Ebitda), a basic measure of a company's financial performance, have risen from 11.7 percent in 2009 to 31 percent through the first nine months of 2014. Exxon Mobil's (XOM) Ebitda so far this year is about half that at 14.3 percent.

The profits associated with oil sands are significant and could not be accomplished without nature's labor.

In green criminological terms, the form of theft that occurs from nature involves extracting non-compensated natural labor that allows the social production of capital and unsustainable human lifestyles that also have a detrimental effect on nature's reproductive system (see Lynch et al, 2013; for related arguments see, Pearce and Tombs, 1998; Ruggiero and South 2013; White, 2002). In terms of the political economic analysis of green crimes, proposition one suggests that green criminologists consider how and whether the extraction of raw materials serves to threaten ecological sustainability in favour of capital accumulation.

Proposition two – Under capitalism technology will accelerate the extraction of natural resources. It is sometimes suggested that technology and technological innovation will improve environmental performance (Klassen and Whybark, 1999). We, however, suggest that technology serves capitalism and not the environment. This is a point developed within treadmill of production theory (Gould, Pellow and Schnaiberg 2008). In the case of resource extraction, capitalism often employs chemically assisted resource extraction technologies to increase production and profit by boosting economic efficiency, lowering extraction and production costs, maintaining or lowering commodity prices, expanding ecological withdrawals, and facilitating expanded consumption. These chemical- and fossil fuel-based technologies have expanded with little concern for their environmental impacts and public health consequences (see also Colborn et al., 2011; Schnaiberg, 1980; Steingraber, 1997).

Chemical production and extraction facilitates environmental degradation in two ways. First, it accelerates the expansionary tendencies of capitalism through ecological withdraws (Schnaiberg, 1980), expanding ecological withdrawals and ecological

disorganization (Lynch et al., 2013). That is, capitalism must produce more to survive (expand) and companies generally do so by expanding production in ecologically harmful rather than in ecologically efficient and sustainable ways. Second, withdrawal technology adds chemicals to the environment by producing waste. Taken together, ecological withdrawals and additions combine with capitalism's growth imperative, meaning that capitalism and nature exist in a state of conflict over technology (Burket, 2009; Foster, Clark and York, 2010; Kovel, 2007; O'Connor, 1997). In that scenario, ecological sustainability is largely subverted by technology and the expansion of production (see also White, 2002). The oil sands are a good example of this phenomenon.

Until recently, the technology to extract the oil from tar sands in a profitable way did not exist. For instance, *The Spring 2015 Alberta Oil Sands Quarterly Update* (http://albertacanada.com/files/albertacanada/AOSID_QuarterlyUpdate_Spring2015.pdf) emphasised that "Canada's oil sands resources are often referred to as *the oil that technology made*," and that "without intensive production technology development, the [Canada's oil sands] industry would not exist." While in the past the sands were only used sporadically by native populations for various subsistence activities, this situation has clearly changed and matches world-wide trends in increasing energy production (Smandych and Kuenenman, 2010). The advances in extraction technology have led to increased oil production from tar sands despite the increase in production of other renewable and non-renewable energy technologies. For example, consider Figure 1, which shows the trends in major (oil, natural gas and coal) carbon-based energy forms over the past thirty years.

[Figure 1 about Here]

As Figure 1 illustrates, there is a global increase in all forms of carbon-based energy extraction. Consistent with global trends, the *Alberta Oil and Gas Quarterly Update* (http://media.angi.s3.amazonaws.com/2015/ANGR_150701TS.pdf) suggests, in Canada “technology is [also] being used in an increasing number of oil plays [and that] technological advancement has set the stage for *another boom* in Alberta’s non-oil sands oil and natural gas industry” (emphasis added).

An additional dimension of this problem relates to the contribution sand oil production makes to climate change and its other ecological impacts such as deforestation of one of the world’s largest Boreal forests, water pollution and wildlife habitat effects. For example, it has been estimated that burning all the sand tars would contribute a significant rise in global mean temperature, excluding the ecological costs of the energy used to extract those sand tars (Biello, 2013). Disturbance of the boreal forest through sand tar mining also disrupts the peatland carbon sink, which causes an additional contribution to climate change (Turetsky et al., 2002). Consequently, it appears that new extraction technology accelerates rather than decelerates adverse forms of ecological disorganization. . Green criminologists, then, might examine when technology is used to facilitate green crimes. This issue was addressed in detail by Smandych and Kuenenman (2010) who note that the amount of oil that can be extracted from the oil sands in Alberta is based on available technology and that the plan is to develop technology to expand production. As a result, the researchers question the extent to which “the actors involved in portraying, causing and profiting from the development and continued growth of Alberta tar sands industry be viewed as engaging in a form of state-corporate environmental crime” (Smandych and Kuenenman 2010:95).

Proposition three - The extraction of raw materials needed for production disrupts and disorganize the ecology. The extraction of raw materials used in production creates ecological disorganisation. That is, when energy stored in fossil fuels is extracted for use in production, that process disorganizes nature because it takes energy that was concentrated in raw materials in nature and converts it to energy to help create products that will be sold in the marketplace (Stretesky, Long and Lynch, 2013a). However, not all that extracted energy is transferred to products. Instead, some energy is released into the environment in the form of heat. Thus, the process of entropy – or the movement of energy from an organized to disorganized form – occurs (Schnaiberg, 1980). Moreover, as entropy occurs with the extraction and burning of fossil fuels, ecosystems are often transformed and made extinct along with the species that inhabited those ecosystems. That is, the sustainability of the planet is put at risk because more resources are used than the planet creates (Wackernagel and Rees, 1998). The consequences of this behavior are well-documented in the ecological disorganisation literature (Rockström et al., 2009). For example, consider Figure 2 that shows annual global trends in carbon emissions linked to climate change (see IPCC, 2014).

[Figure 2 About Here]

As noted, the increase in the burning of fossil fuels is forcing the biosphere to confront planetary boundaries that science suggests threatens biosphere conditions conducive to human existence (Rockström et al., 2009). As a result, the extraction of energy has both short and long term consequences for the ecology.

These observations raise a question related to the definition of green crime. Green criminologists employ both a legal and a harm-based definition of green crime,

and some have raise the issue that capitalism produces extra-legal green crimes (Hillyard and Tombs, 2007; Pierce and Tombs, 1998). Radical criminologists interested in green crime have noted that the legal definition of crime is far from adequate when studying green crimes (Lynch et al., 2013; Lynch, Stretesky and Long, 2015) precisely because green crimes create harms the law fails to identify. Those harms, however, have been identified scientifically (e.g., the idea of planetary boundaries, excessive ecological footprints, studies of the ecological and health effects of ecological destruction). Scientific studies indicate that resource extraction and production generates important ecological harms that should not be overlooked. The proposition that extraction disorganises nature is especially important to criminologists because in the harm-based view, the harm caused by unsustainable production could be redefined as criminal or as a crime against nature (Lynch and Stretesky, 2014; Lynch et al, 2013).

Radical criminologists have also asserted that crime as defined by the state is closely linked to identifying acts that disrupt capitalism (Chambliss 1975; Spitzer 1975). The same logic could be applied to acts that disrupt natural production when it threatens sustainability and life on earth. In green criminological terms, the recognition that production takes place in nature suggests that the disruption of this natural system for the accumulation of wealth may constitute a 'crime against nature.'³ Here, we have simply extended observations about economic disruption and crime to ecological disruption. Green criminologists, then, draw upon the proposition that the accumulation of wealth under capitalist production is based on the theft of nature's labor. Rather than adopting a

³ This is consistent with Marxist ecology. As capitalists exploit nature to acquire raw materials, they also exploit human labor to manufacture commodities and wealth (Burkett 2009).

view that crime is something that interferes with commerce (i.e., capitalism), this ecologically-centered view suggests that green crimes are behaviors that interfere with ecological sustainability (Lynch and Stretesky, 2014). That is, crime might be viewed as an act that disrupts nature's production and reproduction, or as behaviors that generate ecological disorganization

Green criminologists should also recognize that it is not theoretically sufficient to suggest that *all polluting actors* that operate within capitalism and pollute the environment to increase profit are criminal (see also Pearce and Tombs, 1998). Human existence requires the production of some level of ecological disorganization. At issue is when that form of ecological disorganization becomes as disruptive as to constitute a crime against nature. As noted above, scientific standards and studies can be used to identify when those disruptions are significant enough to cross the boundary between sustainable human behavior and excessive human consumption of ecological resources. Unsustainable human behaviors, therefore, are those at issue in this view.

Under capitalism, the constant accumulation of wealth means that ecological additions must expand and become problematic when the structure of capitalism impedes the ability of nature to reproduce itself and therefore sustain conditions of life (Burkett, 2009). This is the case with the tar sands because the extraction of that energy threatens Canadian ecosystems. For example, consider the following description of the impact of Alberta oil sands production on ecosystems:

[W]hat you see is a landscape erased, a terrain stretching in a radius of many hundreds of square kilometres that is not so much negatively impacted as forcibly stripped bare and excavated. Dominating this landscape are half a dozen giant

extraction and refining plants with their stacks and smoke and fire, disorientingly wide and deep mines, and tailings ponds held in check by some of the world's largest dams (Gillespie, 2008).

Scientific research on the deleterious ecological impacts of oil sands extraction also indicates that they cause adverse ecology and human health consequences (Tenenbaum, 2009). Timoney and Lee's (2009) review of scientific evidence of the impacts of tar sands development raised four questions:

(1) Do present levels of contaminants, regardless of origin, present an ecosystem or human health concern? (2) Is there evidence of increased levels of contaminants when sites downstream of industry are compared to sites upstream of industry? (3) Is there evidence of increased levels of contaminants over time? and (4) Are there documented incidents of industrial pollution or degradation?

Timoney and Lee determine that the answer to each of these questions is "yes," suggesting that there is an increase in heavy metals and other air pollutants and some of these increases are observed in fishes. Moreover, they note that the effects of tailing (waste) ponds are likely responsible for the large numbers of birds that die each year and extensive ecosystem destruction. Finally, they raise concerns about the destruction of large amounts of plant life near the mines. These results suggest that production has taken priority over ecological interests in Alberta, and that sand oil production disrupts the local and global ecosystem and ecological sustainability, thus generating ecological disorganization.

Proposition four – *Access to the raw materials needed to generate wealth is*

unequal. Access to and control of the means of production is not equal under capitalism (Marx, 1976 [1867]). This unequal access to production is the basis of capitalism's class system. But, unequal access to production is conditioned by a pre-existing and unequal distribution of resource ownership produced in previous historical stages of human development.⁴ For capitalism to succeed, however, the working class must be maintained in a state of existence where it cannot reproduce itself outside of its relation to capital, or outside of its relation to capitalism as worker (Marx, 1976[1867]). It is, therefore, a basic requirement of capitalism that the worker be maintained at a level of economic development where they can reproduce themselves *only* as workers, but at the same time be kept from accumulating sufficient wealth to alter the class structure (Marx, 1904[1859]).

Unequal access to the means of production is essential to the maintenance of the class structure of capitalism. This has implications for the development of a green criminology. For example, the legal structure of capitalism promoted the class structure that emerged under capitalism by reversing traditional or customary rules that provided the poor with access to the means of production (e.g., common lands) or alternatives to wage labor as a form of subsistence (Marx, 1842; Rusche and Kirchheimer, 1939). In response to these conditions, the laws of capitalism establish mechanisms that limit working class access to raw materials in nature, separating the working class and nature (Marx, 1842). Because access to the raw materials of nature is the first prerequisite of capitalist production (see Burkett, 2009) by legally restricting access to nature, the poor

⁴ Thus, Marxism is not simply a description of unequal ownership patterns and how they are reinforced by the capitalism (Marx, 1976[1867]).

and working class must rely on capitalism and the destruction of nature to survive (Marx, 1842). But, capitalism not only restricts the poor's access to nature, it also forces them to participate in ecological destruction by converting raw materials into products to be sold in the marketplace. These observations help demonstrate the complex relationship between labor and environmental harm (Chambliss, 1975; Linebaugh, 1976; Marx, 1904[1859]) through which labor's participation in production promotes ecological disorganization (Foster et al., 2010) and, in some instances, leads them to engage in acts that are defined as environmental crime (Stretesky et al., 2013).

Importantly, the legal system of capitalism and the unequal distribution of the means of production transformed traditional hunting and gathering relations and replaced them, so that it now requires wages to purchase means of production access rights (e.g., the licensing of hunting or gathering, and so on; see Eliason, 2012). In this way, the legal rules regulating and reinforcing unequal access to the means of production forces a legal wedge between the working class and nature. Important to green criminologists is that unequal access to nature may result in the criminalization of the poor who access nature (sometimes to survive or protect their culture) without paying the fee (e.g. Cantzler, 2007; Giltner, 2008; Wyatt, 2013; Zulu, 2010).⁵ For example, tar sands that were used by native peoples for subsistence living are now controlled by powerful companies who make a profit from these sands (Nikiforuk, 2010). Thus, rather than study these individuals (Native people) as criminal, green criminologists might consider refocusing

⁵ For example, Vandana Shiva (1997) has documented how corporations patent indigenous knowledge systems in ways that prevents the entire groups of people from legally using what nature produces (i.e., natural remedies for example) unless they pay the corporation a fee. This phenomena, is sometimes described as “bio-piracy.”

their attention on the structural forces of capitalism that produce those harms.

Capitalism's legal (see Pashukanis, 2007[1924]) and economic rules create the mechanism by which the working class is officially alienated from nature through its relation and attachment to capital. Separating the working class from nature creates an ecological (see Foster et al. 2010) and social (Burkett, 2009) rift that places workers in a position where they destroy nature (in legal and sometimes illegal ways for capitalist accumulation). This is also seen in the Canadian tar sands, where workers are placed in a position where they must support oil sands development. For instance, the Canadian Association of Petroleum Producers (2015) suggests that

Almost every community in Canada has been touched by oil sands development through the stimulating impact it has on job creation and economic growth. A closer look reveals that oil sands development creates a significant number of jobs outside Alberta. The goods, materials, and services used to construct and operate in situ oil sands projects, mines, and upgraders come from across Canada. Many of the components – trucks, gauges, valves, pumps – are produced in Central and Eastern Canada. The oil sands currently provides jobs for 514,000 people across Canada (direct, indirect and induced) and this is expected to grow to over 800,000 jobs in 2028. Many of these jobs will be created in provinces outside of Alberta.

As a result, the expansion of oil sands development means that while workers engage in harmful activities, they benefit economically (see also Pearce and Tombs, 1998).

But these same workers and the poor are also individually criminalized when they engage in the consumption of nature for survival. Thus, the unequal access to means of

production reproduces itself with respect to who is and is not criminalized for consuming nature and damaging ecosystems.

Unequal access to land and resources harms people and has human rights implications. This causes secondary harms because it does not allow native peoples to engage in subsistence practices, but rather forces them to join the treadmill of production or die. Moreover, Marxist ecologists note that maintaining limited access to natural resources is central to reinforcing the worker-labor separation (Burkett, 2009; Foster 1992; 2000). This occurs because the capitalist controls the raw materials of nature by controlling the means of production and the requirement that workers' labor for the capitalist to earn wages for survival. In this way, the worker's relation to nature is filtered through the relations of the worker to capitalism, and the use of labor to create commodities controlled by the capitalist class. The separation of the worker from nature and their control of their own labor involves a process of exploiting both labor and nature which allows the capitalist to retain some of the workers' labor (in the form of surplus value), and facilitate the extension of class disparities in the form of wealth and ownership.

For green criminology, the manipulation of the relationship between work and nature, and labor and raw materials, must be addressed as a central aspect of the origin of green crime. As ecological Marxists note, in order to generate profit, capitalism must exploit both labor and nature, accelerating that exploitation over time to accumulate (Foster et al., 2010), and consequently joining those forms of exploitation together. This is accomplished by manipulating production to minimize the application of the volume of labor required to extract and convert raw materials into commodities. In doing so, green

criminologists should consider that access to raw materials is uneven and that laws will favor capitalists and disadvantage the poor.

Proposition five – The market will create laws and engage in enforcement that favors the economy over the environment. The capitalist market is an inadequate mechanism for generating environmental protection (Pearce and Tombs, 1998). The view that the market’s pricing mechanism, which responds to the supply-demand function, is capable of creating the conditions for environmental preservation is, in our view, misguided, and overlooks economic substitution effects where the market shifts to other raw materials and then uses those materials at an unsustainable rate (O’Connor, 1997). According to the market view, as raw materials are used up, the market responds by increasing their price (Burns, Lynch and Stretesky, 2008). This occurs, according to market theorists, because supply dwindles relative to demand, causing scarcity and thus rising prices. This traditional economic argument suggests that capitalism will protect nature through pricing mechanisms (Burns et al., 2008; Pearce and Tombs, 1998). The historical record on pricing as a form of protection is replete with examples of the failure of the market to efficiently protect the environment. There are numerous reasons why this occurs. These reasons may include insufficient knowledge of the supply of raw materials, or inefficient mechanisms for predicting demand (Burns et al., 2008). In either case, the market fails to perform as its proponents suggest.⁶

Capitalist markets may also fail to provide for environmental protection for other reasons. In the case of commodities such as fossil fuels, government-controlled market

⁶ In order to “accurately” reflect the “state of the market” (supply-demand function with respect to raw materials), capital and the capitalist state spend significant resources reassuring the market that new raw material deposits are continually being discovered.

regulations establish conditions where the prices of commodities are subsidized. Those subsidies artificially change the price structure of the market, promoting further capitalist expansion and environmental degradation (O'Connor, 2001). This process protects the capitalist from the effects of the market if the price of commodities were not subsidized. In this sense, we can say that government interventions that promote capitalist expansion appear as state-corporate crime against the environment by stimulating ecological destruction (Kramer, Michalowski, and Kauzlarich, 2002). This link between state subsidies and environmental destruction is something that needs to be considered by green criminologists.

A related concern is the overall nature of how the state regulates corporate behavior that causes ecological disorganization. In the case of the oil sands, lax enforcement allows for an increase in production. For example, a review of nearly 9,262 environment incidents associated with oil sands production in Alberta between 1996 and 2012 (Timoney and Lee, 2013), suggests that enforcement is lax and that only 0.9% of all reported incidents are subject to enforcement. Moreover, the report notes that in the case of tar sands (Timoney and Lee, 2013: 240):

Because enforcement is rare, and most enforcement actions pose little more than a minor cost of doing business (a median penalty of \$4,500), industry has little incentive to undertake improvements that might result in increased costs. It is more cost-effective to pay the financial penalties.

As a result, green criminologists might seek to determine how production influences environmental laws but also how production influences enforcement and penalties (Griefe and Stretesky, 2013; Stretesky, Long and Lynch, 2013b).

The market also fails to serve as an appropriate control for environmental destruction because capital continually invents new methods of production that minimize the costs of extracting raw materials (e.g., mountain top removal in terms of coal – see Bell and York, 2010). Those new methods of production often have multiple detrimental impacts on the ecological system, as ecological costs are not included in the calculation of capital as suggested in proposition one. That is, as new production techniques become more efficient they also tend to become more destructive. Treadmill of production research highlights this concern, noting that since WWII, expansion of the capitalist economy has been increasingly driven by innovations in chemically assisted raw material extraction that are more efficient, but also more ecologically harmful (Schnaiberg, 1980). Importantly, extraction efficiency may also cause raw material prices to decline by artificially inflating the appearance of raw material availability on the market.

Conclusion

This analysis drew attention to the relationship between nature and capitalism and emphasized that capitalism has important ecological disruptive effects that can be defined as green crimes that have important implications for developing a political economic approach to green criminology. To do so, we proposed specific propositions concerning the relationship between capitalism and ecological disorganization. We illustrated how those propositions apply to oil sands development within Canada. Taken together these propositions suggest that capitalism and nature are at odds and that capitalism not only provides the structure for harming nature, but also shapes the very way we think about crime and the environment (White, 2002).

To provide a theoretical framework for the political economy of green

criminology we have elaborated five propositions that focus on the relationship between the ecology and capitalism. Throughout that discussion, we have illustrated the strength of this view and the reasons that criminologists should consider these propositions and their meaning for green criminology. As we suggest, chief among these environmentally destructive forces is capitalism, which is the antithesis of nature (O'Connor, 1997).

Because of this, O'Connor (1997) has suggested capitalism and nature cannot both survive. Some might argue that capitalism (and the capitalist class) is incredibly resilient and has survived a number of prior crises ⁷ (for extensive discussion of those crises see, Harvey, 2011). But, as ecological Marxists note, there is a significant difference between economic crises and ecological crises, and an important literature on the ecological crises of capitalism now exists which questions whether capitalism can solve these ecological crises (e.g., Foster, 2002, 1992; O' Connor, 1997, 1988).

Despite its need for nature as the basis of production, capitalism cannot exist outside of its exploitative relationship to nature. Yet, while needing the input of nature, capitalism has done a rather poor job of protecting nature from capitalism's ecologically destructive tendencies. Whether capitalism can promote legal changes required to protect nature in the future is an open question that has yet to unfold sufficiently, but the past history of environmental law and the long term ecologically destructive tendencies of capitalism suggest otherwise.

⁷ We thank an anonymous reviewer for pointing this out.

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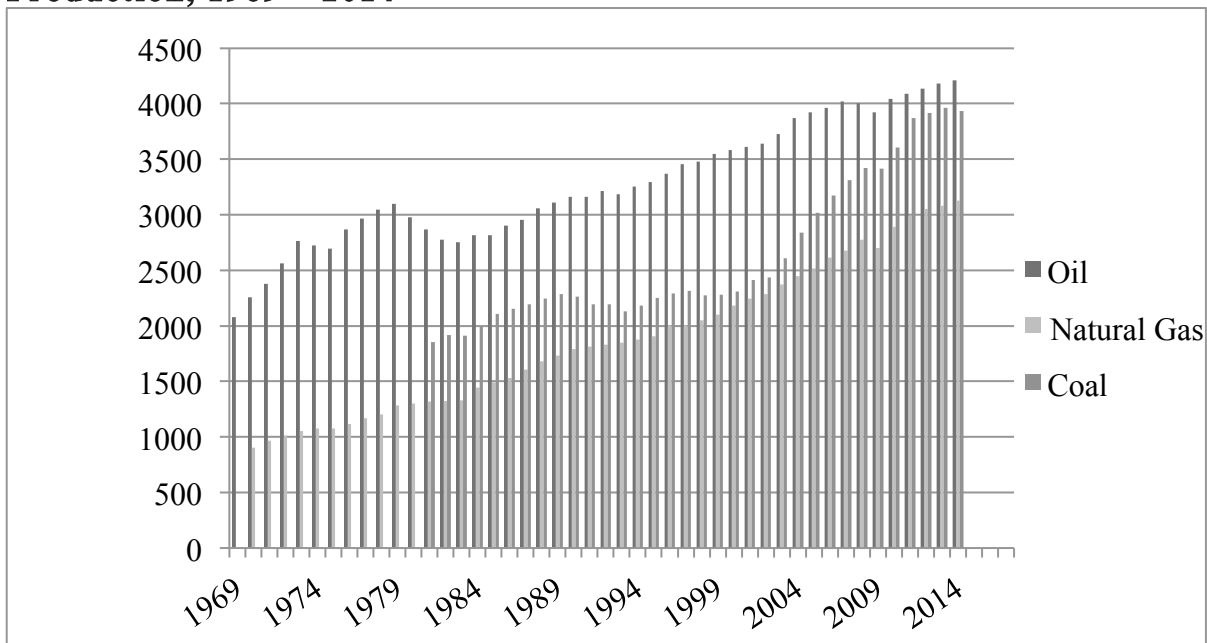
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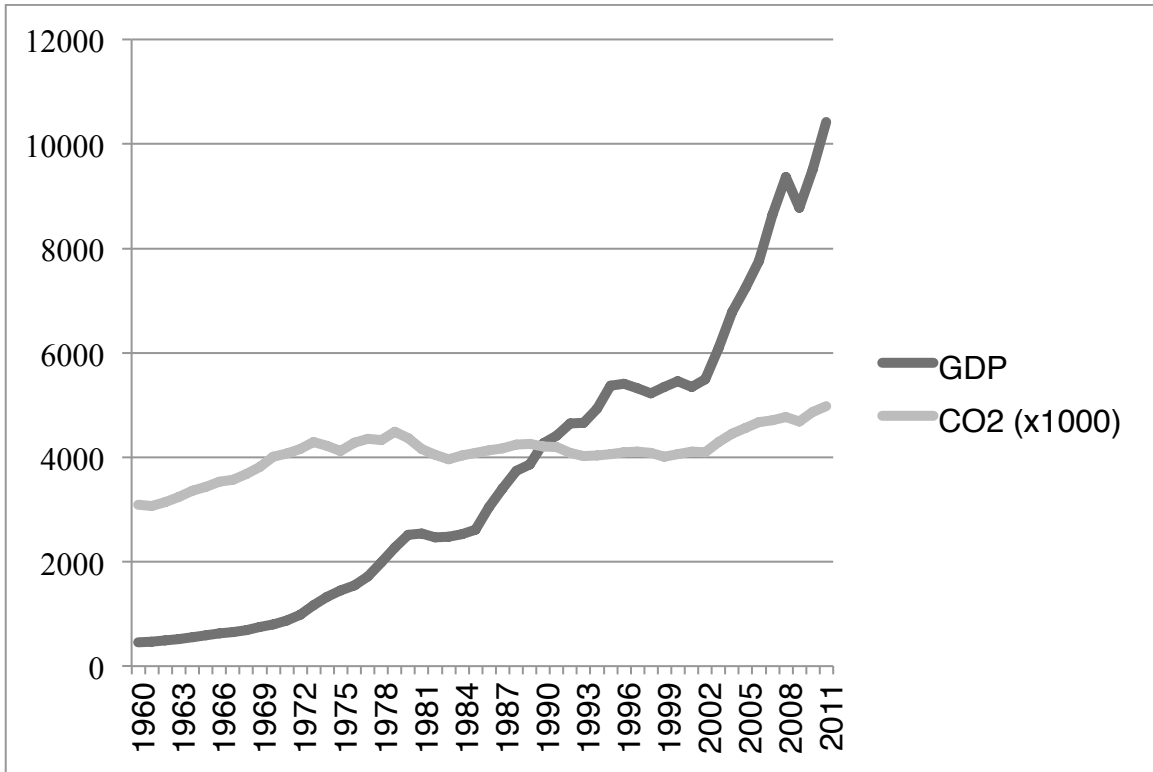
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Figure 1. World-Wide Trends in Oil, Natural Gas and Coal Production, 1969 – 2014^a



^a Oil is displayed in millions of tonnes. Natural gas and coal are converted to oil equivalent tonnes.
Source: British Petroleum's *The Statistical Review of World Energy 2015* (<http://www.bp.com/>).

Figure 2. Trends in GDP Per Capita (in Constant U.S. Dollars) and Carbon Dioxide Releases Per Capita (in metric tons x 1,000 per capita), 1960 – 2011.



Note: Data come from the World Bank (<http://data.worldbank.org/>).