Measuring the Ecological Impact of the Wealthy: Excessive Consumption, Ecological Disorganization, Green Crime, and Justice

Michael J. Lynch
University of South Florida, Tampa, USA

Michael A. Long
Oklahoma State University, Stillwater, USA

Paul B. Stretesky
Northumbria University, Newcastle, UK

&

Kimberly L. Barrett
Eastern Michigan University, Ypsilanti, USA

Word Count

9,789

Accepted

9 April 2019

Citation

Lynch, Michael J., Michael A. Long, Paul B. Stretesky, and Kimberly L. Barrett. "Measuring the Ecological Impact of the Wealthy: Excessive Consumption, Ecological Disorganization, Green Crime, and Justice." *Social Currents*, (May 2019). doi:10.1177/2329496519847491.

Acknowledgments
The authors would like to thank aviation pilot Matthew Fox for providing information concerning accessing data on private aircraft use and fuel use, and the anonymous reviewers and editors of *Social Currents* for their comments and suggestions.

Abstract

Ecological disorganization stemming from conspicuous consumption practices is understudied in the social sciences. In this analysis, we study conspicuous consumption and its implications for environmental sociology, ecological footprint analysis, and green criminology. We examine the issue of conspicuous consumption through the study of items that increase the ecological footprint considerably, that is, through the consumption of "luxury commodities." Specifically, we draw attention to assessing aspects of ecological footprints of super yachts, super homes, luxury vehicles, and private jets. Taken together, the construction and use of these items in the United States alone is likely to create a CO2 footprint that exceeds those from entire nations. These results are not necessarily surprising but suggest that excessive consumption practices of the wealthy may need to be reinterpreted as criminal when they disrupt the normal regeneration and reproduction of ecosystems by generating excessive ecological disorganization.

Keywords

conspicuous consumption, ecological footprint, environmental sociology, consumers and consumption, green criminology

Introduction

In *How the Rich are Destroying the Earth*, Herve Kempf suggests that a portion of the current ecological crisis stems from excessive consumption by the rich (see also Bollier 2013; Di Muzio 2015). Reinforcing that point, studying household incomes, and carbon footprints, Kennedy, Krahn, and Krogman (2014) refer to the wealthiest income group (quintile) as "egregious emitters" due to their much higher level of consumption. As Rees and Westra (2003) note, "Since the wealthy fifth or so of humanity consumes 80+ per cent [sic] of global economic output, the rich alone effectively 'appropriate' the entire capacity of Earth in important dimensions" (p. 112). In contrast to these arguments, business and economics researchers often describe luxury item consumption as ecologically sustainable because luxury commodities last longer (Amatulli et al. 2017).

It is widely accepted across nations that one perk of being wealthy is to consume as one pleases. Such pleasures can promote excessive consumption which uses up natural resources, causing ecological disorganization—disruptions in the normal functioning of the ecosystem in ways that prohibit its regeneration/ reproduction, causing increasing ecosystem instability (Lynch et al. 2016, chp. 3; Schnaiberg 1980; Stretesky, Long, and Lynch 2013b). Under the influence of contemporary post–WWII capitalism, new wants were stimulated to enhance profit making, increasing a new form of excessive consumption Migone (2007) calls "hedonistic consumption." Kempf suggests that excessive consumption by the wealthy has relatively old roots, best described by Thorsten Veblen's ([1899] 1934) theory of conspicuous consumption. In Veblen's view, the wealthy purposefully consume luxury items publicly and to excess to elevate or maintain their social status (for a validating empirical test see Heffetz 2011). Kempf, in turn, argues that modern conspicuous consumption by the wealthy generates extensive ecological harms and that the wealthy generate disproportionately more ecological harm than the poor or middle classes.

Other views support this contention at different scales of analysis. This idea is also expressed in aggregate patterns of ecological consumption across nations measured using ecological footprints (Jorgenson 2003, 2012; Jorgenson and Clark 2011; Knight, Schor, and Jorgenson 2017; York, Rosa, and Dietz 2003). For example, controlling for trade relations between nations, footprint analysis indicates an association between cross-national ecological consumption and national income levels, meaning citizens consume more in wealthier nations (Prell 2016; Prell and Sun 2015; Weinzettel et al. 2013). Such analyses indicate that wealthier (also called “advanced” or “developed”) economies have much larger ecological footprints than less-developed nations. In advanced economies, there is a greater tendency for consumption in general, and perhaps some tendency for all classes to mimic the conspicuous consumption habits of the wealthy (Podoshen and Andrzejewski 2012). Across nations, these consumption patterns can be understood relative to the global capitalist economy in relation to theories such as metabolic rift (Foster 2011; Foster, Clark, and York 2011). In metabolic rift terms, excessive consumption in developed nations is fed by ecological withdrawals from less-developed nations, and transferring metabolic materials and natural wealth from less developed to developed nations is part of the nature of global capitalism and the process of ecological unequal exchange (Jorgenson 2006).

In criminology, excessive consumption has been connected to the production of ecological disorganization and viewed as a green crime against nature (Lynch et al. 2013). Here, we argue that the wealthy’s excessive or conspicuous consumption should be conceptualized as a form of green crime within the contemporary context of global ecological collapse (Barnosky et al. 2012; Barry 2014) that generates: unnecessary ecological disorganization and consumption inequities, a decline in global ecological quality, uneven ecological access and destruction, and unequal exposure to environmental hazards across nations.

Here, we examine four indicators of conspicuous consumption's ecological impacts to illustrate the above. Where possible, we compare those outcomes to average consumption to better gauge the impact of conspicuous consumption on ecological disorganization. When such comparisons cannot be made, we refer to the "gross harm" associated with conspicuous consumption. Our four examples include the ecological impacts of (1) operating super yachts (SYs); (2) building super homes (SHs) (those greater than 25,000 square feet); (3) operating luxury cars (costing more than $42,000) in the United States; and (4) for individual and corporate operation of private jets.

Background

Currently, many nations have excessive ecological footprints and increased levels of ecological destruction (Foster et al. 2011). By "excessive," we mean an unsustainable ecological footprint.

Empirically, ecological footprints measure biocapacity availability against consumption/ecological withdrawals, with ecological footprints less than 1.0 defined as sustainable and those greater than 1.0 as unsustainable. The current global ecological footprint is 1.7, indicating excessive consumption relative to available and replaceable biocapacity (http://www.footprintnetwork.org/).

Research indicates that controlling for trade relationship effects, a nation's ecological footprint varies with income, so that higher income nations tend to have larger ecological footprints (Ivanova et al. 2015; Weinzettel et al. 2013). For some high consuming nations, where footprints are greater than 1.0, consumption is augmented by consuming available biocapacity in other nations as part of the global structure of capitalism (Foster et al. 2011). In this sense, excessive consumption within some nations is facilitated by the global capitalist world system, which enhances the transfer of raw materials from less-developed nations to more-developed nations as part of ecological unequal exchange (Jorgenson 2006). The organization of this system contributes to global and local ecological decline and disorganization. As Schor (2005) argues, it is now widely known that current consumption patterns fostered by the falling prices of goods in the global capitalist market place due to increased capital mobility are ecologically unsustainable (see also Alcott 2008). Coupled with changing and more positive attitudes toward conspicuous consumption among populations, such as those in China where there is now a growing class of wealthy consumers (Podoshen, Li, and Zhang 2011), local and global world capitalist markets are accelerating resource consumption with potentially disastrous ecological consequences.

Ecological footprint analysis demonstrates variability in consumption behaviors and ecological impacts across nations and that "developed" or "advanced" nations have higher ecological footprints than less-developed nations (Jorgenson 2003; Jorgenson, Schor, Huang, and Fitzgerald 2016; Jorgenson, Schor, Knight, and Huang 2016; Wiedenhofer et al. 2017). Within and across developed nations, Kempf argued that the wealthy's consumption habits cause excessive ecological harm compared to the behavior of individuals in other income classes (see also Feng, Zou, and Wei 2011; Yang, Wu, and Cheung 2016). Consistent with that argument, Oxfam International (2015) notes that while the poorest half of the world's (3.5 billion people) population generates 10 percent of carbon emissions, the richest 10 percent produce nearly one-half of carbon dioxide emissions.

As noted above, prior literature (e.g., Kempf 2008) argued that the wealthy have an excessive ecological footprint and make unequal ecological contributions to carbon footprints (Kennedy et al. 2014) and ecosystem resource consumption (Rees and Westra 2003). In this sense, excessive consumption can be linked to Veblen's ([1899] 1934) concept of conspicuous consumption. After noting the origins of leisure, Veblen argued that the historical process of capital accumulation concentrated capital in ways that allowed the emergence of a new leisure class.

The leisure class engaged in visible forms of excessive consumption as a customary basis of repute and esteem . . . [P]roperty now becomes the most easily recognised evidence of a reputable degree of success . . . [and] the conventional basis of esteem. Its possession in some amount becomes necessary. . .to any reputable standing in the community. It becomes indispensable to accumulate, to acquire property, in order to retain one's good name. (Veblen [1899] 1934: 15)

Here, acquiring property and consuming excessively become marks of distinction, and to earn those marks, the leisure class must consume. When connected to contemporary arguments in ecological Marxism concerning the contradictions between capitalism and nature (Foster 1999, 2000), one can argue that excessive consumption must result in excessive ecological disorganization or the excessive consumption of nature. This latter argument is empirically testable, and the association between various measures of ecological consumption and environmental degradation has been subjected to several empirical tests (Givens and Jorgenson 2011; Jorgenson 2003, 2006; Jorgenson and Clark 2011).

Criminologically speaking, excessive consumption is relevant to defining and understanding concepts such as green crime and green justice. In green criminology, excessive consumption generates what treadmill of production theory describes as ecological disorganization or an accelerating pace of consumption that disrupts the normal functioning of the ecosystem that prohibits its regeneration and reproduction (Schnaiberg 1980). Green criminology emerged in 1990 as an extension of Marxist/radical criminology (Lynch 1990; on radical criminology see Lynch and Michalowski 2006) and was introduced to create a political economic understanding of how environmental harms that affected ecosystems and ecosystem inhabitants (including human and nonhuman life) and the production of ecological and environmental injustice. The green criminological literature is diverse, addressing, among other issues: (1) theoretical and empirical research grounded in political economic and treadmill of production theory (Long, Lynch, and Stretesky 2018; Long et al. 2012; Lynch et al. 2013; Stretesky, Long, and Lynch 2013a; Stretesky et al. 2013b; Stretesky and Lynch 2011; Stretesky et al. 2017; Stretesky et al. 2018); (2) theory and research about harms against nonhuman animals, and controlling those harms (Beirne 1999; (Nurse 2015; Sollund 2011); (3) discussions of biopiracy, food exploitation, and hunger (South 2007; Walters 2006, 2007); (4) green-cultural criminology, which examines "mediated depictions" of ecological harm (Brisman and South 2013); (5) empirical studies of environmental injustice (Lynch, Stretesky, and Burns 2004; Stretesky and Lynch 1998, 2002) and carbon emissions (Stretesky and Lynch 2009) as examples of green crimes; (6) studies of compliance with environmental regulations (Barrett et al. 2018; Kahler and Gore 2012); and (7) research on conservation criminology (Gibbs et al. 2009; Gore 2011), which promotes risk assessment studies of conservation crimes (Gibbs et al. 2011), empirical studies of opportunity structures affecting green crimes, and the control of conservation crimes (Petrossian 2015; Petrossian, Rolf, and Clarke 2016; Pires and Clarke 2012).

Drawing on various theoretical perspectives such as treadmill of production, world systems theory, and ecological unequal exchange, green criminologists have posited that the adverse outcomes associated with ecological disorganization are tied to the expansionary tendencies of the capitalist world system (Lynch et al. 2013). Here, ecological disorganization is the sum of the deleterious effects of two connected economic-ecological processes: ecological withdrawals that disrupt ecosystems by removing resources from the environment and ecological additions that disrupt ecosystems by adding pollution to environments (Schnaiberg 1980). In an effort to promote growth and capital accumulation, in addition to exploiting labor, capitalist must expand the market, which means producing more goods and more demand for those goods. To increase production, capitalism must increase withdrawals of ecological resources, causing ecosystem damage or disorganization. Those raw materials are then fed into the manufacturing process where, applying fossil fuel and chemical energy, other forms of ecological disorganization are created: pollution or ecological additions. Drawing on these insights and from ecological Marxism (Foster 1992, 1997, 2000), green criminologists suggested that the ordinary production of commodities via the capitalist process, creates ecological disorganization and can be conceptualized as a form of green crime from the perspective of nature and also as a form of green/ecological injustice (Lynch et al. 2013).

The view above suggests that the problem of ecological disorganization/destruction and injustice is structural; and that its primary cause is found in the organization and operation of the global capitalist economy (as well as within the organization and structure of "local" or national capitalism), which drives expanding ecological withdrawals of resources, increasing levels of ecological additions (i.e., pollution) and accelerating consumption to persistently increase profit making—the ultimate goal of capitalism. It is well known that these features of capitalism show up not only in other structural phenomenon (i.e., class struggle; unequal ownership of production; unequal wage structures; class, race, and gender discrimination; unequal distribution of wealth and income; a diminishing social safety net, and so on, (Foster 1992, 1997, 2000) but also at lower levels of aggregation, and empirically, this must occur for structural inequality to be present. With regard to this structural argument and following Kempf, it is possible to examine how structural inequities play out at lower levels of aggregation.

Below, we employ examples of how excessive consumption by the wealthy increases their ecological footprint, impacts ecological stability (Davison 2016), and contributes to behaviors stimulated by capitalism both ideologically (consumption-based stimulus that can be addressed, for example, by green-cultural criminology (Brisman and South 2013, 2014)) and structurally. That kind of empirical evidence contributes to political economic green criminological and green-cultural criminological explanations of green crimes and injustice (Lynch and Stretesky 2014).

In contrast to views described previously, some marketing researchers argue that luxury brand consumption by the wealthy is “inherently” sustainable (Amatulli et al. 2017:97). Marketing researchers argue that luxury commodities are “inherently” sustainable because they last forever (e.g., diamonds), and that the longevity of these items reduces their ecological footprints. These are dubious assertions. For example, consider the ecological costs of serving short-lived commodities with extensive ecological effects. Serendipity 3, a New York restaurant, at one time served a dessert that Guinness’ Book of World’s Records identified as the world’s most expensive dessert: *Frrrozened Haute Chocolate* ice cream sundae. The dessert’s price, US$25,000, was due to the inclusion of 28 different forms of cocoa, five grams of edible gold foil, and the take home serving container that included an 18-carat gold, diamond encrusted bracelet and serving spoon. One hardly needs to argue about the known deleterious ecological harms associated with cocoa farming (Noble 2017); let alone gold mining, even at the “artisanal” level (Pavilonis et al. 2017), or diamond mining—which may involve “conflict diamonds,” unequal core-peripheral exchanges in the diamond commodity chain and issues of ethical consumption (Le Billon 2008). Other extreme luxury items which challenge the narrative of sustainable, low-ecological impact luxury consumption include: Vizoury’s “Pure White” luxury dumbbell, coated in ruthenium, 750 flawless white diamonds (7.5 carats), and a custom made walnut storage box (29,000 Euros); or Gout de Diamants champagne, with a hand-crafted solid white-gold label containing 18 carats of diamonds (US$1.8 million). A list of other such items can be found on the Bornrich.com web site.

While it is possible to explore numerous examples of ecological harms generated by individual luxury products, ecological harms are more visible in larger aggregates of luxury consumables. By examining these larger aggregates, a picture of the ecological footprint of luxury consumption in comparison to "average" or similar kinds of consumables in a category can also be undertaken. To do so, we examine four examples of how the wealthy's consumption of luxury items generates excessive ecological disorganization: the operation of Sys; the building of SHs; the operation of luxury vehicles; and the operation of private jet aircraft. These categories were selected because they can be aggregated, and, as noted below, these impacts can be described in ecologically relevant terms such as carbon equivalent impacts.

Conspicuous Consumption, Ecological Disorganization, and Sys

There is little need to argue that only the wealthiest people can purchase and operate Sys. An average SY costs $3 million a year in fuel, maintenance, docking, and staffing (Mathew2015).TheinitialSYbuy-independs on its size. For larger SY, the buy-in averages $275 million, with an upper price near US$1 billion (see below). For smaller, less wellequipped SY, prices range from $12 to $50 million. Gadd (2015) estimates there are only about 200,000 individuals in the world (0.0027 percent of the global population) with sufficient accumulated assets—which he defined as more than $30 million—to afford even the smallest SY.

The term SY emerged in the early 1900s to refer to the increasingly large boats private individuals were building as their wealth increased. This is an example of the kind of conspicuous consumption to which Veblen drew attention at the end of the nineteenth century. Sys are yachts larger than 24 meters/79 feet in length, and can, *on average*, range up to 70 meters/230 feet. The largest SY—those over 300 feet—are also referred to as megayachts or giga-yachts. Some SY are over 500 feet in length, such as the Fulk al Salamah (164 m/538 feet) and the Azzam (180 m/590 feet).

As of 2012, there were an estimated 32 mega/giga yachts in the world. Globally, there are 100 Sys larger than 230 feet and 300 Sys larger than 60 meters/196.9 feet (this information is updated live, http://www.superyachts. Com/largest-yachts/worlds-largest-yachts-live. Htm). Despite the small size of the SY fleet, it has extensive ecological consequences. At the microlevel, an example of this harm was widely reported in January 2016 when one of the Sys owned by *Microsoft*'s cofounder, Paul Allen, crashed into a protected coral reef, damaging up to 14,000 square feet or 80 percent of the reef.

On a larger scale, it is difficult to estimate the full extent of the ecological costs of building and operating Sys. It is unclear, for example, how much steel, 12luminium or other metals, fiberglass, exotic materials and so forth, are involved in building an SY, and clearly, the quantities vary depending on an SY's size and amenities, which can be extensive. Some Sys include "extras" such as helicopters, submarines, and smaller boats; and the volume of waste generated by operating Sys (e.g., food, paper, and fecal waste) are unknown. These "extras," along with size, can make Sys not only financially pricey, but also costly environmentally. Reportedly, the world's most expensive SY, the *Eclipse*, cost between US$800 million to US$1.5 billion. At 162.5 meters/533 feet, it is also the world's second largest SY and contains 6,000 square feet of living space in 18 guest cabins. In addition, the master suite is 5,000 square feet and with 11,000 square feet of floating living space, the *Eclipse* is five times the size of an average U.S. home. It is operated by a 92-person crew, and the crew requires living space not accounted for above. In short, it should be clear that Sys are owned by the very wealthy, and therefore, any ecological harm generated from building and operating Sys stems from the conspicuous consumption behaviors of the wealthy.

In our effort to quantify Sys' ecological impacts, we admit omitting their full ecological impacts and costs. For example, we were unable to estimate the volume of various materials (e.g., rare woods and metals) and the quantity of energy used to construct Sys. *Our estimate* *focuses only on the carbon footprint of Sys in use* and, as a result, drastically underestimates the full scope of the ecological disorganization generated by building Sys. Likewise, our comparisons are based on employing U.S. commodities, and the ecological effect difference may be greater or less on the nation used for comparative purposes.

Operating an SY is expensive and ecologically damaging. On average, an SY over 71 meters/233 feet uses 500 liters/132 gallons of gasoline *an hour*, and annual fuel costs for an average SY are around $400,000. From available data, we estimated that an average (71 meter) SY uses about 107,000 gallons gasoline/year and produces 2.1 million pounds of carbon dioxide emissions annually. Thus, the fleet of 300 SY produces approximately 627 million pounds of carbon dioxide emissions a year. That very large figure needs to be placed in context. To do so, we compare the carbon and gasoline footprint of Sys owned by the wealthy to the average vehicle—a more affordable mode of transportation for the average person operated in the United States.

An average new car gets 25.5 miles per gallon (mpg) in the United States. According to the U.S. Department of Transportation (U.S. DOT) (https://www.fueleconomy.gov), an average person drives about 13,476 miles, using 528.5 gallons of gas, and generates 10,358.6 pounds of CO_2 pollution annually. Thus, one average SY produces as much CO_2 pollution as 202 average cars, and, annually, the SY fleet ($N = 300$) uses as much gasoline as 60,600 cars that get 25.5 mpg.

Another way to illustrate the annual ecological harm caused by SY is to compare the CO_2 emissions from the 300 largest SY to the CO_2 emissions of entire *nations*. The SY fleet carbon emissions (nearly 630 million pounds), for example, is similar to the emissions of the 10.6 million inhabitants of Burundi (654.02 million pounds), and 5.7 times larger than the carbon footprint (111,556,039 pounds) of the small (36,157 inhabitants) developed nation of

Liechtenstein. Thus, the carbon footprint of the global SY fleet of the wealthy produces as much ecological disorganization as entire nations of people.

Ecological Housing Footprint of SHs

The wealthy often own multiple homes. Their primary homes can be extremely large and their home-related ecological footprint may extend beyond their primary home. Here, we focus attention only on the largest homes of the wealthy in the United States, whether they are primary or secondary homes. To do so, we collected data on the largest homes for sale in the United States in November 2016. Similar to large Sys, we refer to these homes as “super homes”.

Before beginning, we note that our analysis underestimates the ecological effect of building SHs since we can only estimate their ecological effects from general home construction guidelines. Moreover, we could not quantify the effects of using luxury or exotic construction materials (i.e., rare wood or stone). We restricted our analysis to free-standing homes (i.e., excluded apartments and condominiums). In addition, since our data are drawn from the United States, the results may not generalize to other nations.

It is difficult to compare average SHs to average homes. According to the U.S. Department of Commerce, the average size of new homes varies over time and has tended to increase since the early 1970s (Perry 2015; U.S. Department of Commerce 2015). Nevertheless, average new home data provide a rough estimate of the difference in size and the ecological footprint of average U.S. homes and SHs.

-Table 1 About Here-

The price of SHs in our data varied considerably, from \$3 to 5 million to more than \$100 million dollars. Table 1 shows information for 39 SH for sale in the United States during the six-month period from April, 2016, through November, 2016. Data shown in this table were extracted from and cross-referenced with several real estate web sites (e.g., Zillow and Trulia) to obtain additional home characteristics. As Table 1 indicates, these homes had: (1) a mean price of $27.76 million; (2) total mean square feet of 39,798 (35,300 in main building, plus 4,498 square feet in additional buildings); and (3) total building square footage (other buildings on the property, including garages when not included in the listing) of 1,552,107. In contrast, during the same time period, an average U.S. home: (1) cost $188,000 (147 times less); (2) contained about 2,200 square feet (SHs were about 18 times larger); and (3) included about 576 square feet of garage space.

To compare the ecological costs of these different categories of homes, we calculated (1) the approximate square feet of *wood* used to build each type; (2) estimated the number of trees required to build the average home in each group; and (3) translated trees used into carbon footprints. These estimates may not represent the true ecological effect of SHs because SHs likely include additional/larger wood trims (e.g., wood cabinetry, base-board moldings, chair rails, corner blocks, and ceiling moldings), and other wood finishes (i.e., solid woods) compared to average homes, and we did not adjust for those potential differences, which cannot be measured without more specific information on each SH in the sample. Thus, we likely underestimate the ecological disorganization effect of SHs.

Calculating the carbon-related ecological footprint of a home is difficult and requires several transformations described in brief below. For example, the *Idaho Forest Products Commission*'s web site indicates that an average home includes 12.5 board feet of wood products per square foot for nonconcrete slab houses. A board foot is a board one inch × 12 inches × 12 inches. Our estimate is based on an average house, and not on estimates of board feet in new constructions alone, which over time declined (see Lutz 2016 for trends). As a result, our estimate, because it includes older homes in the average, yields a higher board foot estimate.

Following the above, an average American home contains about 27,500 board feet. To simplify our comparison, we assumed that SHs use the same square foot ratio of wood products as an average home. This assumption likely underestimates the board feet in SHs because SH likely include more wood in their construction (e.g., additional wood trims) than an average home. SH also includes other omitted ecological effects from the use of rare woods, old growth forest woods, and so on, that have not been taken into account. Nevertheless, we estimated that an average SH used 497,475 board feet of wood product or 18.09 times as much wood product as an average U.S. home.

Next, we translated board feet into tree equivalents using the "Doyle Rule" for determining board feet from a tree (see, Guldin and Baker 1988). From the Doyle Table, we selected a relatively large tree (48 foot tall, 36 inch diameter) for the board feet transformation. It is likely, however, that average homes and SH use different wood stocks and have different wood stock ecological effects (e.g., some trees grow faster), but we were unable to address those effects. From the Doyle table, each tree we selected produces 1,310 board feet. Thus, a 2,200 square foot/27,700 board foot home uses 20 trees, while an average SH (497,475 board feet) consumes 380 trees, or has a tree-related ecological withdrawal effect about 19 times higher (without accounting for additional wood-use differences).

Tree harvesting can also impact wildlife population stability, which is an additional ecological cost of home building. We calculated that effect using federal data relating wildlife population stability relative to forest density. Following U.S. Federal guidelines, forest density of 300 trees per acre is suitable for wildlife population stability (U.S. Department of Agriculture 2015). Using this estimate and our tree use estimates above, an average home consumes seven percent of a well-forested area, whereas an SH consumes 127 percent of a well-forested area. Translated into other measures, this means that five wellforested acres could produce wood for 71.43 average homes, but for only four SHs.

An alternative measure of environmental harm from home building can be derived by estimating the carbon sequestration potential lost to trees harvested for home building—a measure which also illustrates the connection between ecological withdrawals, ecological disorganization, carbon pollution, and climate change. Doing so requires a series of estimates to translate trees used into carbon sequestration equivalents. For our example, we used trees described earlier (48 feet in height; 36 inch diameter; 72 inch circumference). Tree circumference can be used to estimate tree age, and tree age is then used to calculate carbon sequestration.

The simplest tree age estimation suggests that each inch in circumference is equivalent to one year's growth (for more complex tree growth and species-specific models see Colbert et al. 2004). As our examples trees have a 72 inch circumference, they would be approximately 72 years old. Scientific studies indicate that an average tree sequesters about 48 pounds of carbon dioxide annually, and that large trees have an average life span of 150 years (Nowak and Crane 2000). In our example, then, harvested trees have 78 years of life remaining at time of harvest. Over those 78 now lost years, an average tree could potentially sequester 3,744 pounds of CO_2 (78 × 48 pds/year).

Using our sample trees, an average home requires harvesting 20 trees and an SH requires 380 trees. Carbon sequestration loss for an average home is, therefore, 74,880 pounds CO_2, while it is 1,422,720 for an SH—or nearly 20 times greater for an SH.

The 39 SH homes in Table 1 generate a carbon sequestration loss of 55,486,080 pounds, which is the equivalent loss associated with building 741 average homes. Again, this procedure may underestimates the carbon sequestration effect of building SHs because they are likely to contain more wood products than we use in our estimates.

Luxury Car versus BestSelling Car Footprints

The wealthy also have adverse ecological impacts through their automobile purchasing and operating habits. The wealthy possess the ability to purchase vehicles (i.e., luxury vehicles) largely unavailable to the average consumer. While the definition of a luxury vehicle is debatable (Flint 2009), those vehicles typically cost "much more" than the average vehicle and have features "beyond what is necessary." For our analysis, we only employ data on new car sales from 2015 (mean car price in 2015 was $35,543). Price data were extracted from Kelley Blue Book (KBB; https://mediaroom.kbb.com/new-cartransaction-prices-jump-august-2015). In 2015, KBB indicated an average compact car sold for $20,560, while the entry level price for the luxury car market began at $ 42,383. Based on these data, we employed a cutoff of $42,000 to identify luxury cars sold in the United States in 2015. Those data, which appear in Table 2, were aggregated depending on the available data (e.g., by maker, or by maker and model), and include the sale of hybrid vehicles.

-Table 2 About Here-

As with SHs, luxury vehicles have multiple ecological effects, some of which cannot be directly measured. First, these vehicles tend to be larger and building them consumes more ecological resources. Second, luxury vehicles use materials not found in average cars, and thus have different ecological impacts than an average car (e.g., they may include wood trim). And third, luxury cars, with the exception of hybrids and electric vehicles, tend to perform less efficiently, consume more gasoline, and have a larger carbon dioxide use footprint. Of these ecological effects, the CO_2 footprint can be measured.

To create a comparative CO_2 use footprint, we collected miles per gallon (MPG) data for all luxury cars sold in the United States, and a sample of the best-selling (i.e., average) cars in the United States. Car sales data were collected from the web site Left-Lane.com. MPG data were derived from the U.S. government web site, www.fueleconomy.gov.

Luxury sales and MPG data were collected for 39 luxury models or brands for vehicles costing most than $42,000. For some luxury brands, individual vehicle sales were small and were thus averaged to create a brand average rather than a model listing. The total number of luxury vehicles sold in the United States in 2015 was 708,909. The sales and MPG data for each model/brand were used to calculate a *weighted MPG* effect for each model/brand, and then the weighted effects were summed to create an average MPG for all luxury vehicles sold in 2015 (see Table 2). As shown in Table 2, the average MPG of the entire luxury fleet (all 708,909 luxury cars sold) was 19.59 mpg. In Table 2, the relative MPG effect for each model/brand is created by multiplying the percent of sales for each model/brand of luxury cars sold by each model/ brand's average MPG. The sum of each model/ brand relative MPG is the average MPG of all vehicles in the luxury class sample.

The same procedure was followed for top 10 vehicles sold (*N* =2,324,510). Each top 10 model's MPG was then derived from the fueleconomy.gov web site. The weighted MPG effect for these vehicles (31.28) was derived using the same procedure outlined above (see Table 3 for results for top 10 vehicles). The sum of the weighted MPG score equals the average MPG for the entire fleet of top 10 vehicles sold.

-Table 3 About Here-

From these data (Tables 2 and 3), it is clear that an average luxury vehicle's MPG (19.59) is significantly less efficient than an average top 10 selling model's MPG (31.28). In relative terms, top 10 vehicles sold were 62.63 percent more fuel efficient than luxury vehicles. From the MPG data, we can crudely estimate the CO_2-use effect in several ways.

First, for luxury vehicles, we estimated that for every 1,000 miles driven, 51.05 gallons of gasoline are required. The U.S. Energy Information Administration (https://www.eia.gov/environment/emissions/ co2_vol_mass.php) estimates that one gallon of consumed gasoline generates about 19.6 pounds of carbon dioxide. Thus, 51.05 gallons of gasoline consumption translate into 1,000.58 pounds of CO_2 emissions per every 1,000 miles driven in a luxury car. For 708,909 luxury vehicles driven 1,000 miles each, this equates to 1,000,580 pounds of CO_2 emissions. For the top 10 selling vehicles, gasoline consumption per 1,000 miles driven is 31.97, which translates into a CO_2 output of 626.60 pounds/1,000 miles. Compared to top 10 selling vehicles, a luxury vehicle produces, on average, 373.98 more pounds of CO_2 emissions per 1,000 miles traveled, or 59.68 percent more CO_2 emissions.

The CO_2 difference noted above, however, is misleading. Miles driven annually varies by income, and thus some effort must be made to address that difference since income and luxury vehicle purchases are likely connected. Adjusting for this effect helps derive a better measure of the ecological effect of driving luxury vehicles.

Income-related miles driven can be estimated from U.S. DOT (2011) data. U.S. DOT data do not report miles driven by income directly, however, but instead provides data on the number of trips (i.e., defined as travel from one address to another in a motor vehicle) by income, and average trip length in miles by income. These data can be combined to estimate miles traveled annually by income groupings. In 2009, the average number of trips across all income groups was 2,640, but for high-income groups (incomes greater than $80,000) equaled 4,815 or was 82 percent higher than the average.

Moreover, trip length also varies by income, and it has been reported that automobile travel is shaped by class membership/income (Kotval-K and Vojnovic 2016). For lowincome users, average trip length is 8.85 miles. So, for this group, average trip length (8.85 miles) times the average number of trips (2,640) equals average miles driven per year = 23,364. For the high-income group, average trip length (11.5 miles) times 4,815 trips = 55,373 miles annually. These outcomes can then be converted in CO_2 outputs per vehicle, which would be

55,404 pounds for one vehicle in the high-income group and 17,958 pounds for one vehicle in the low-income group.

Private Luxury Jets Footprints

The average individual does not own or operate a private luxury jet. That privilege and the ecological destruction that goes along with it belongs only to the wealthiest individuals and businesses/corporations that employ private jet services. As an example, Donald Trump owns a Boeing 757 (U.S. registration number N757AF). Today, there are more than 14,939 private jets registered in the United States alone (https://registry.faa.gov/aircraftinquiry/). Private jets can cost thousands of dollars to operate and rent per hour and have extensive ecological costs related to the burning of gasoline and CO_2 emissions.

To estimate those effects, we used data on the most popular private jets. Those data were drawn from a Forbes Magazine (Ewalt 2013) article that identified the 12 most popular private jets used in the United States. Data on gasoline consumption per hour, variable operating costs (fuel, maintenance, parts, and labor), and average rental costs were collected for these private jets from the web site Jetadvisors.com (2016). These data are displayed in Table 4.

-Table 4 About Here-

Data on the number of hours of operation for each plane model found over a one-year period are unavailable. Thus, to estimate the annual ecological footprint of operating private jets, we used the average hourly fuel consumption by model (see Table 4) along with National Business Aviation Association (2015) estimates of the number of hours flown by individuals, businesses, corporations and for instructional purposes in private jets. Those data indicate the following use patterns: individuals, 8,000,000 hours; business, 2,400,000 hours; corporate, 2,700,000 hours; and instructional, 3,900,000 hours; total hours, 17 million. From

Table 4, mean hourly fuel consumption for the 12 listed private jet models can be estimated and is equal to 344.17 gallons/hour.

The average volume of CO_2 produced from burning one gallon of jet fuel is 21.1 pounds (https://www.eia.gov/environment/emissions/ co2_vol_mass.php). Thus, from 2014 data, we estimate the carbon footprint from private plane use (17 million hours; 344.16 gallons fuel/hour; 21.1 pounds CO_2 /hour) to be 55.996 million metric tons annually. Based on U.S. Energy Information Administration total U.S. CO_2 emissions, private jets generate only about one percent of total U.S. carbon emissions. Nevertheless, despite the small percentage of total U.S. carbon emissions generated by private planes, the aggregate emissions are substantial. Earlier, for example, we noted that Burundi's 10.6 million residents generate about 650 million pounds or 294,835 metric tons of CO_2, which is about 45 percent of the CO_2 produced by the operation of private jets in the United States. This comparison is notable in the context of the present discussion to the extent that it illustrates how wealth translates into expanded consumption and additional adverse ecological consequences.

Discussion and Conclusion

This article examined the effect of the wealthy on ecological disorganization using estimates of their ecological footprint related to the conspicuous consumption of particular luxury items. Prior studies suggest that income and ecological destruction are positively related (Brounen, Kok, and Quigley 2012; Kempf 2008). Within the context of green criminology, this information is useful for illustrating how the wealthy unequally contribute to green harms/crimes and injustice (Brisman and South 2014). As noted, ecological footprints vary across nations, and some nations produce more ecological destruction/disorganization than others through excessive consumption. A similar argument has also been made about social classes—the wealthy generate more ecological disorganization than other income groups due to conspicuous consumption. We addressed that issue estimating carbon dioxide outputs for SHs, SYs, luxury cars, and the private jet fleet in the United States.

Conspicuous consumption is, as Thorsten Veblen argued, part of the nature of capitalism and the consumption habits capitalism generates. We extended this line of thought to suggest that the wealthy not only control production through ownership and management of the means of production, they also have a large ecological footprint that influences the course of ecological disorganization. In some cases, as illustrated above, their behaviors have ecological consequences as large as those produced by the populations of some nations. These results are not necessarily surprising, as one of the uses of accumulated wealth in a capitalist economy is consumption. These outcomes—both conspicuous consumption and the adverse ecological consequences such consumption generates—have been described as being part of the nature of capitalism (Foster 2000) and as one of its contradictions (Foster 1992). Ecological Marxists, however, have not been alone in pointing out this type of concern. Reviewing this issue, Hornborg (2009) identifies what he calls "the restricted number of critics of industrial capitalism," which is illustrated in the development of the ecological economics literature (see Hornborg 2009:246–51; Martinez-Alier 1987). Those views, which include among others, emergy analysis, zero-sum growth arguments, steady-state economics, metabolic rift analysis, and ecological unequal exchange theory, all point toward the problem of ecological destruction and disorganization associated with capitalist production and consumption. Whether capitalism can be reorganized (e.g., steady-state economics) or must be replaced to solve the large-scale nature of the ecological crisis is, one can argue, an ideological question that depends on the initial assumption made in any of these approaches. Nevertheless, it can still be illustrated, as we have shown above, that the consumptive behaviors of the wealthy, who comprise a small part of the world's population, has a much more significant ecological impact than the behavior of other economic groups. Based on that observation, one could argue that it is necessary to devise strategies for controlling the conspicuous consumption habits of the wealthy. How that might be accomplished and assessing the economic effects of such restrictions is beyond the scope of this article.

Theoretically, prior research within green criminology suggests that conspicuous consumption and the excessive ecological disorganization such consumption generates can be defined as a green crime—that is, as a crime against ecosystems and the inhabitants of ecosystems including nonhuman life forms, who suffer from those crimes as local and global ecosystems become increasingly disorganized (see also Agnew 2013; Lynch et al. 2013). Drawing upon ecological Marxism, Lynch et al. (2013) specially argue that in a political economic green criminological perspective, that "[a]s a result of the inherent contradiction between capitalism and nature, the capitalist system must be seen as a crime against nature" (p. 998). Outlawing capitalism is unlikely for a variety of reasons, including its global organizational scope, and the stored assets and various forms of political and military power that are routinely employed to prevent such a threat. Even at the local or national levels, the treadmill of environmental law or the organization of environmental laws is structured in ways that protect the capitalist treadmill of production and facilitate its expansion (Long et al. 2018; Stretesky et al. 2013b), meaning that laws/regulations are an unlikely source for controlling conspicuous consumption. Legally, of course, conspicuous consumption is not a crime—it is an acceptable form of behavior encouraged under capitalism. But perhaps it should become a crime, given its adverse ecological impacts. More traditional analysts are likely to object to such a proposition, noting that these expenditures create jobs and allow wealth to "trickle down." The effectiveness of trickle-down economic approaches is mixed at best, and even reports from the International Monetary Fund suggest this form of economics is not viable and often does not stand up to empirical scrutiny (Dabla-Norris et al. 2015).

In the modern context, the wealthy have a great many choices they can make as a result of their wealth. This often involves, as noted earlier, engaging in behaviors that Migone (2007) identifies as hedonistic consumption. Those behavioral choices, often freed from market constrains as a result of the level of economic resource availability the wealthy possess, can also generate extensive ecological harm. An increasing number of quantitative physical and social scientific studies indicate that the odds of local and global ecosystem collapse are expanding and that the continued expansion of production and consumption are part of the problem. Nations across the globe have been engaged in efforts to produce treaties, legislation, and regulations designed to curb production practices. While researchers also note the need to limit consumption as part of protective ecological policies (Meadows, Randers, and Meadows 2004; Schaefer and Crane 2005; Wapner and Willoughby 2005), no such policies about limiting consumption exist.

Researchers in numerous fields can contribute to efforts to promote sustainability and limit the ecologically destructive consumption habits of the wealthy by developing and empirically assessing how such policies would promote ecological sustainability. Such studies are essential to developing a theoretically informed policy literature that explains the need for policies that limit excessive consumption as indispensable in an era where uncontrolled economic growth and expansion has outstripped ecological resource availability and ecological system sustainability.

References

Agnew, Robert. 2013. "The Ordinary Acts that Contribute to Ecocide: A Criminological Analysis." Pp. 58–72 in *Routledge International Handbook of Green Criminology*, edited by N. South and A. Brisman. London, England: Routledge.

Alcott, Blake. 2008. "The sufficiency strategy: Would rich-world frugality lower environmental impact?." *Ecological Economics* 64(4): 770–786.

Amatulli, Cesare, Michele Costable, Matteo De Angelis, and Gialuigi Guido. 2017. "Luxury Consumption and Sustainability." Pp. 97–137 in *Sustainable Luxury Brands: Evidence from Research and Implications for Managers*, edited by C. Amatulli, M. Costable, M. De Angelis, and G. Guido. London, England: Palgrave Macmillan.

Barnosky, Anthony D., Elizabeth A. Hadly, Jordi Bascompte, Eric L. Berlow, James H. Brown, Mikael Fortelius, and Wayne M. Getz, et al. 2012. "Approaching a State Shift in Earth's Biosphere." *Nature* 486(7401):52–58.

Barrett, Kimberly L., Michael J. Lynch, Michael A. Long, and Paul B. Stretesky. 2018. "Monetary Penalties and Noncompliance with Environmental Laws: A Mediation Analysis." *American Journal of Criminal Justice* 43:530– 50. Retrieved April 19, 2019 (https://link. springer.com/article/10.1007/s12103-017-94 28-0).

Barry, Glen. 2014. "Terrestrial Ecosystem Loss and Biosphere Collapse." *Management of Environmental Quality* 25(5):542–63.

Beirne, Piers. 1999. "For a Nonspeciesist Criminology: Animal Abuse as an Object of Study." *Criminology* 37(1):117–48.

Bollier, David. 2013. *Silent Theft: The Private Plunder of Our Common Wealth*. England: Forbes.

Brisman, Avi and Nigel South. 2013. "A GreenCultural Criminology: An Exploratory Outline." *Crime, Media, Culture* 9(2):115–35.

Brisman, Avi and Nigel South. 2014. *Green Cultural Criminology: Constructions of Environmental Harm, Consumerism, and Resistance to Ecocide*. London, England: Forbes.

Brounen, Dirk, Nils Kok, and John M. Quigley. 2012. “Residential Energy Use and Conservation: Economics and Demographics.” *European Economic Review* 56(5):931–45.

Colbert, J. J., Michael Schuckers, Desta Fekedulegn, James Rentch, Máirtín MacSiúrtáin, and Kurt Gottschalk. 2004. “Individual Tree Basal-Area Growth Parameter Estimates for Four Models.” *Ecological Modelling* 174(1–2):115–26.

Dabla-Norris, Era, Kalpana Kochhar, Nujin Suphaphiphat, Frantisek Ricka, and Evridiki Tsounta. 2015. “Causes and Consequences of Income Inequality: A Global Perspective.” International Monetary Fund. Retrieved February 8, 2017 (https://www.imf.org/external/pubs/ft/sdn/2015/sdn1513.pdf).

Davison, Aidan. 2016. “The Luxury of Nature: The Environmental Consequences of Super-Rich Lives.” Pp. 339–62 in *Handbook on Wealth and the Super-Rich*, edited by F. I. Hay and J. V. Beaverstock. Cheltenham, England: Edward Elgar.

Di Muzio, T. 2015. “The Plutonomy of the 1%: Dominant Ownership and Conspicuous Consumption in the New Gilded Age.” *Millennium: Journal of International Studies* 43(2):492–510.

Ewalt, David M. 2013. “Thirty Amazing Facts about Private Jets.” *Forbes*, February 13. Retrieved November 22, 2016 (www.forbes.com/sites/ davidewalt/2013/02/13/thirty-amazing-factsabout-private-jets/#3ec85c082730).

Feng, Zhen-Hua, Le-Le Zou, and Yi-Ming Wei. 2011. “The Impact of Household Consumption on Energy Use and CO2 Emissions in China.” *Energy* 36(1):656–70.

Flint, Jerry. 2009. "The New Definition of a Luxury Car." *Forbes*, December 18. Retrieved April 19, 2019 (https://www.forbes.com/2009/12/17/ luxury-cars-green-business-autos-flint.html).

Foster, John Bellamy. 1992. "The Absolute General Law of Environmental Degradation under Capitalism." *Capitalism Nature Socialism* 3(3):77–81.

Foster, John Bellamy. 1997. "The Crisis of the Earth: Marx's Theory of Ecological Sustainability as a Nature-Imposed Necessity for Human Production." *Organization & Environment* 10(3):278–95.

Foster, John Bellamy. 1999. "Marx's Theory of Metabolic Rift: Classical Foundations for Environmental Sociology." *American Journal of Sociology* 105(2):366–405.

Foster, John Bellamy. 2000. *Marx's Ecology: Materialism and Nature*. New York: New York University Press.

Foster, John Bellamy. 2011. "The Ecology of Marxian Political Economy." *Monthly Review* 63(4). Retrieved April 19, 2019 (http://monthlyreview.org/2011/09/01/the-ecology-of-marxian-political-economy).

Foster, John Bellamy, Brett Clark, and Richard York. 2011. *The Ecological Rift: Capitalism's War on the Earth*. New York: New York University Press.

Gadd, Michael. 2015. "$400,000 in Fuel, $350,000 for Docking and $1.4 Million in Wages PER YEAR: Infographics Reveals the Real Cost of Owning a Superyacht." *Daily Mail*, January 31. Retrieved April 19, 2019 (http://www.dailymail.co.uk/ travel/travel_news/article-2934289/Infographicreveals-real-cost-owning-superyacht.html)

Gibbs, Carole, Meredith L. Gore, Edmund F. McGarrell, and Louie Rivers III. 2009. "Introducing Conservation Criminology: Towards Interdisciplinary Scholarship on Environmental Crimes and Risks." *The British Journal of Criminology* 50(1):124–44.

Gibbs, Carole, Edmund F. McGarrell, Mark Axelrod, and Louie Rivers III. 2011. “Conservation Criminology and the Global Trade in Electronic Waste: Applying a Multi-Disciplinary Research Framework.” *International Journal of Comparative and Applied Criminal Justice* 35(4):269–91.

Givens, Jennifer E. and Andrew K. Jorgenson. 2011. “The Effects of Affluence, Economic Development, and Environmental Degradation on Environmental Concern: A Multilevel Analysis.” *Organization & Environment* 24(1):74–91.

Gore, Meredith L. 2011. “The Science of Conservation Crime.” *Conservation Biology* 25(4):659–61.

Guldin, James M. and James B. Baker. 1988. “Yield Comparisons from Even-Aged and UnevenAged Loblolly-Shortleaf Pine Stands.” *Southern Journal of Applied Forestry* 12(2):107–14.

Heffetz, Ori. 2011. “A test of Conspicuous Consumption: Visibility and Income Elasticities.” *Review of Economics and Statistics* 93(4):1101–17.

Hornborg, Alf. 2009. “Zero-Sum World: Challenges in Conceptualizing Environmental Load Displacement and Ecological Unequal Exchange in the World System.” *Inter-national Journal of Comparative Sociology* 50:237–62.

Ivanova, Diana, Konstantin Stadler, Kjartan Steen-Olsen, Richard Wood, Gibran Vita, Arnold Tukker, and Edgar G. Hertwich. 2015. “Environmental Impact Assessment of Household Consumption.” *Journal of Industrial Ecology* 20(3):526–36.

Jetadvisors.com. 2016. “Aircraft Information.” Retrieved November 22, 2016 (http://jetadvisors.com/aircraft-information/).

Jorgenson, Andrew K. 2003. “Consumption and Environmental Degradation: A Cross-National Analysis of the Ecological Footprint.” *Social Problems* 50(3):374–94.

Jorgenson, Andrew K. 2006. “Unequal Ecological Exchange and Environmental Degradation: A Theoretical Proposition and Cross-National Study of Deforestation, 1990-2000.” *Rural Sociology* 71(4):685–712.

Jorgenson, Andrew K. 2012. “The Sociology of Ecologically Unequal Exchange and Carbon Dioxide Emissions, 1960–2005.” *Social Science Research* 41(2):242–52.

Jorgenson, Andrew K. and Brett Clark. 2011. “Societies Consuming Nature: A Panel Study of the Ecological Footprints of Nations, 1960– 2003.” *Social Science Research* 40(1):226–44.

Jorgenson, Andrew K., Juliet B. Schor, Xiaorui Huang, and Jared Fitzgerald. 2016. “Income Inequality and Residential Carbon Emissions in the United States: A Preliminary Analysis.” *Human Ecology Review* 22(1):93–106.

Jorgenson, Andrew K., Juliet B. Schor, Kyle W. Knight, and Xiaorui Huang. 2016. “Domestic Inequality and Carbon Emissions in Comparative Perspective.” *Sociological Forum* 31(S1):770–86.

Kahler, Jessica S. and Meredith L. Gore. 2012. “Beyond the Cooking Pot and Pocket Book: Factors Influencing Noncompliance with Wildlife Poaching Rules.” *International Journal of Comparative and Applied Criminal Justice* 36(2):103–20.

Kempf, Hervé. 2008. *How the Rich Are Destroying the Earth*. White River Junction, VT: Chelsea Green.

Kennedy, Emily Huddart, Harvey Krahn, and Naomi T. Krogman. 2014. “Egregious Emitters: Disproportionality in Household Carbon Footprints.” *Environment & Behavior* 46(5):535–55.

Knight, Kyle W., Juliet B. Schor, and Andrew K. Jorgenson. 2017. “Wealth Inequality and Carbon Emissions in High-Income Countries.” *Social Currents* 4(5):403–12.

Kotval-K, Zeenat and Igor Vojnovic. 2016. “A Socio-Ecological Exploration into Urban Form: The Environmental Costs of Travel.” *Ecological Economics* 128:87–98.

Le Billon, Philippe. 2008. “Diamond Wars? Conflict Diamonds and Geographies of Resource Wars.” *Annals of the Association of American Geographers* 98(2):345–72.

Long, Michael A., Michael J. Lynch, and Paul B. Stretesky. 2018. “The Great Recession, the Treadmill of Production and Ecological Disorganization: Did the Recession Affect Ecological Disorganization across US States, 2005-2014?” *Ecological Economics* 146:184–92.

Long, Michael A., Paul B. Stretesky, Michael J. Lynch, and Emily Fenwick. 2012. “Crime in the Coal Industry: Implications for Green Criminology and Treadmill of Production.” *Organization & Environment* 25(3):328–46.

Lutz, Jack. 2016. “Wood Use in Housing.” *Forest Research Notes* 13(1):1–4.

Lynch, Michael J. 1990. “The Greening of Criminology: A Perspective for the 1990s.” *The Critical Criminologist* 2(3):3–411.

Lynch, Michael J., Kimberly L. Barrett, Paul B. Stretesky, and Michael A. Long. 2016. “The Weak Probability of Punishment for Environmental Offenses and Deterrence of Environmental Offenders: A Discussion Based on US EPA Criminal Cases, 1983-2013.” *Deviant Behavior* 37(10):1095–109.

Lynch, Michael J., Michael A. Long, Kimberly L. Barrett, and Paul B. Stretesky. 2013. “Is It a Crime to Produce Ecological Disorganization? Why Green Criminology and Political Economy Matter in the Analysis of Global Ecological Harms.” *British Journal of Criminology* 53(6):997–1016.

Lynch, Michael J. and Raymond J. Michalowski. 2006. *Primer in Radical Criminology*. Monsey, NY: Criminal Justice Press.

Lynch, Michael J. and Paul B. Stretesky. 2014. *Exploring Green Criminology: Toward a Green Revolution in Criminology*. Farnham, England: Ashgate.

Lynch, Michael J., Paul B. Stretesky, and Ronald G. Burns. 2004. "Determinants of Environmental Law Violation Fines against Oil Refineries: Race, Ethnicity, Income and Aggregation Effects." *Society & Natural Resources* 1(4):333–47.

Martinez-Alier, Joan. 1987. *Ecological Economics, Energy and Society*. Oxford, England: Blackwell. Mathew, Jerin. 2015. "True Cost of Owning a Super Yacht." *International Business Times*, May 15. Retrieved April 19, 2019 (http://www.ibtimes. co.uk/true-cost-owning-super-yacht-1498302). Meadows, Donella, Jorgen Randers, and Dennis Meadows. 2004. *Limits to Growth: The 30-Year Update*. White River Junction, VT: Chelsea Green Publishing.

Migone, Andrea. 2007. "Hedonistic Consumerism: Patterns of Consumption in Contemporary Capitalism." *Review of Radical Political Economics* 39(2):173–200.

National Business Aviation Association. 2015. "2014 Business Aviation Fact Book." Retrieved November 20, 2016 (https://www.yumpu.com/ en/document/view/24705888/business-aviation-fact-book-2014).

Noble, Mark D. 2017. "Chocolate and the Consumption of Forests: A Cross-National Examination of Ecologically Unequal Exchange in Cocoa Exports." *Journal of World - Systems Research* 23(2):236–68.

Nowak, David J. and Daniel E. Crane. 2000. "The Urban Forest Effects (UFORE) Model: Quantifying Urban Forest Structures and Functions." Pp. 714–20 in *Integrated Tools for Natural Resource Inventories in the 21st Century*, edited by M. Hansen and T. Burk. St. Paul, MN: U.S. Department of Agriculture.

Nurse, Angus. 2015. *Policing Wildlife: Perspectives on the Enforcement of Wildlife Legislation*. New York: Palgrave MacMillan.

Oxfam International. 2015. "Extreme Carbon Inequality." Retrieved April 19, 2019 (https: //www-cdn.oxfam.org/s3fs-public/file_attachments/mb-extreme-carbon-inequality-0212 15-en.pdf)

Pavilonis, Brian, Jean Grassman, Glen Johnson, Yilmael Diaz, and Jack Caravanos. 2017. "Characterization and Risk of Exposure to Elements from Artisanal Gold Mining Operations in the Bolivian Andes." *Environmental Research* 154:1–9.

Perry, Mark. 2015. "Today's New Homes are 1,000 Square Feet Larger than in 1973, and Average Living Space per Person Has Doubled." American Enterprise Institute. Retrieved December 20, 2016 (www.aei.org/publication/todays-new-homes-are-1000-square-feetlarger-than-in-1973-and-living-space-per-person-has-doubled-over-last-41-years/).

Petrossian, Gohar A. A. 2015. "Preventing Illegal, Unreported and Unregulated (IUU) Fishing: A Situational Approach." *Biological Conservation* 189:39–48.

Petrossian, Gohar A., A. Rolf, and Ronald V. Clarke. 2016. "Illegal Long-Line Fishing and Albatross Extinction Risk." *Oryx* 52(2):336–45.

Pires, Stephen and Ronald V. Clarke. 2012. "Are Parrots CRAVED? An Analysis of Parrot Poaching in Mexico." *Journal of Research in Crime and Delinquency* 49(1):122–46.

Podoshen, Jeffrey S. and Susan A. Andrzejewski. 2012. "An Examination of the Relationships between Materialism, Conspicuous Consumption, Impulse Buying, and Brand Loyalty." *Journal of Marketing Theory and Practice* 20(3):319–34.

Podoshen, Jeffrey S., Lu Li, and Junfeng Zhang. 2011. "Materialism and Conspicuous Consumption in China: A Cross-Cultural Examination." *International Journal of Consumer Studies* 35(1):17–25.

Prell, Christina. 2016. "Wealth and Pollution Inequalities of Global Trade: A Network and Input-Output Approach." *The Social Science Journal* 53(1):111–21.

Prell, Christina and Laixiang Sun. 2015. “Unequal Carbon Exchanges: Understanding Pollution Embodied in Global Trade.” *Environmental Sociology* 1(4):256–67.

Rees, William E. and Laura Westra. 2003. “When Consumption Does Violence: Can There Be Sustainability and Environmental Justice in a Resource Limited World?” Pp. 99–124 in *Just Sustainabilities: Development in an Unequal World*, edited by J. Agyeman, R. D. Bullard, and B. Evans. London, England: Earthscan.

Schaefer, Anja and Andrew Crane. 2005. “Addressing Sustainability and Consumption.” *Journal of Macromarketing* 25(1):76–92.

Schnaiberg, Allan. 1980. *The Environment: From Surplus to Scarcity*. New York: Oxford University Press.

Schor, Juliet B. 2005. “Prices and Quantities: Unsustainable Consumption and the Global Economy.” *Ecological Economics* 55(3):309–20.

Sollund, Ragnhild. 2011. “Expressions of Speciesism: The Effects of Keeping Companion Animals on Animal Abuse, Animal Trafficking, and Species Decline.” *Crime, Law and Social Change* 55(5):437–51.

South, Nigel. 2007. “The ‘Corporate Colonisation of Nature’: Bio-Prospecting, Bio-Piracy and the Development of Green Criminology.” Pp. 230– 47 in *Issues in Green Criminology*, edited by P. Beirne and N. South. Devon, England: Willan.

Stretesky, Paul B., Michael A. Long, and Michael J. Lynch. 2013a. “Does Environmental Enforcement Slow the Treadmill of Production? The Relationship between Large Monetary Penalties, Ecological Disorganization and Toxic Releases within Offending Corporations.” *Journal of Crime and Justice* 36(2):233–47.

Stretesky, Paul B., Michael A. Long, and Michael J. Lynch. 2013b. *The Treadmill of Crime: Political Economy and Green Criminology*. London, England: Routledge.

Stretesky, Paul B. and Michael J. Lynch. 1998. "Corporate Environmental Violence and Racism." *Crime, Law, and Social Change* 30(2):163–84.

Stretesky, Paul B. and Michael J. Lynch. 2002. "Environmental Hazards and School Segregation in Hillsborough County, Florida, 1987-1999." *The Sociological Quarterly* 43(4):553–73.

Stretesky, Paul B. and Michael J. Lynch. 2009. "A Cross-National Study of the Association between per Capita Carbon Dioxide Emissions and Exports to the United States." *Social Science Research* 38:239–50.

Stretesky, Paul B. and Michael J. Lynch. 2011. "Coal Strip Mining, Mountain Top Removal and the Distribution of Environmental Violations across the United States, 20022008." *Landscape Research* 36(2):209–30.

fStretesky, Paul B., Michael J. Lynch, Michael A. Long, and Kimberly L. Barrett. 2017. "Does the Modernization of Environmental Enforcement Reduce Toxic Releases? An Examination of Self-Policing, Criminal Prosecutions and Toxic Releases in the United States, 1988–2012." *Sociological Spectrum* 37(1):48–62.

Stretesky, Paul B., Ruth McKie, Michael A. Long, Michael J. Lynch, and Kimberly L. Barrett. 2018. "Where Have All the Falcons Gone? Saker Exports in a Global Economy." *Global Ecology & Conservation* 13:1–14.

U.S. Department of Agriculture. 2015. "Virginia Technical Forestry Note # 3: Tree and Shrub Establishment Guidelines." Natural Resource Conservation Services, U.S. Department of Agriculture, Washington, DC.

U.S. Department of Commerce. 2015. "Characteristics of New Housing." Retrieved January 2, 2017 (http://www.census.gov/construction/chars/).

U.S. Department of Transportation. 2011. “Summary of Travel Trends: 2009 National Household Travel Survey.” U.S. Department of Transportation, Washington, DC. Retrieved April 19, 2019 (http://nhts.ornl.gov/2009/pub/ stt.pdf).

Veblen, Thorsten. [1899] 1934. *The Theory of the Leisure Class: An Economic Study of Institutions*. New York: Penguin.

Walters, Reece. 2006. “Crime, Bio-Agriculture and the Exploitation of Hunger.” *British Journal of Criminology* 46(1):26–45.

Walters, Reece. 2007. “Food Crime, Regulation and the Biotech Harvest.” *European Journal of Criminology* 4(2):217–35.

Wapner, Paul and John Willoughby. 2005. “The Irony of Environmentalism: The Ecological Futility but Political Necessity of Lifestyle Change.” *Ethics & International Affairs* 19(3):77–89.

Weinzettel, Jan, Edgar G. Hertwich, Glen P. Peters, Kjartan Steen-Olsen, and Alessandro Galli. 2013. “Affluence Drives the Global Displacement of Land Use.” *Global Environmental Change* 23(2):433–38.

Wiedenhofer, Dominik, Dabo Guan, Zhu Liu, Jing Meng,NingZhang,andYi-MingWei.2017. “Unequal Household Carbon Footprints in China.” *Nature Climate Change* 7:75–80.

Yang, Zan, Shuping Wu, and Hiu Ying Cheung. 2016. “From Income and Housing Wealth Inequalities to Emissions Inequality: Carbon Emissions of Households in China.” *Journal of Housing and the Built Environment* 32(2):231– 52.

York, Richard, Eugene A. Rosa, and Thomas Dietz. 2003. “Footprints on the Earth: The Environmental Consequences of Modernity.” *American Sociological Review* 68(2):279–300.

Table 1. Sample of Largest Super Homes for Sale Characteristics, 2016 US [N = 39].

Location	$ millions	Square feet[a]	Square feet[b]	Name
Potomac, MD	9.250	25,051	2,500	Versailles Mansion
Divide, Co	5.750	25,206	[c]	
Hunting Valley, Oh	2.400	25,213	1,500	
Paradise Valley, AZ	25.000	25,416	8,450	
Wellington, FL	7.950	25,793	[d]	
Springville, UT	8.000	26,000	3,150	
Alamo, CA	28.000	26,739	[e]	
Gainesville, GA	3.500	26,891	[e]	
Clifton, VA	6.200	27,000	[e]	
San Antonio, TX	9.800	27,417	[e]	
Savanah, GA	12.500	28,000	13,800	
Tampa, FL	4.199	28,363	1,750	
Post Falls, ID	9.995	28,469	[e]	
Holladay, UT	18.400	28,740	[f]	
Potomac, MD	4.295	29,018	[e]	
Prosper, TX	12.750	29,122	[e]	
Montecito, CA	125.000	29,483	18,000	
Scottsdale, AZ	32.000	29,700	[e]	
Los Angeles, CA	88.000	30,000	[e]	
Atlanta, GA	8.000	30,000	[e]	
Barrington, IL	18.775	30,000	[e]	
Alpine, NJ	48.880	30,000	[e]	
Barrington, IL	5.999	33,000	6,000	Blue Heron Estate
Boca Raton, FL	6.950	32,511	5,040	
Potomac, MD	18.000	33,000	3,000	
Ellison Bay, WI	8.750	35,000	2,500	Ellison Bay Manor
Hillsborough, CA	23.888	35,000	5,500	King's Domain
Philadelphia, PA	13.950	36,957	3,000	Tri-Wing Manor
Holmby Hills, CA	–	38,000	[e]	
Cartersville, GA	19.900	40,000	8,000	
Paradise Valley, AZ	10.000	40,280	4,000	
Beverly Hills, CA	–	43,000	[e]	
Lantana, FL	32.500	45,143	4,000	Paradiso Del Mar
Cartersville, GA	8.500	47,000	2,500	
Hillsboro Beach, FL	159.000	47,774	12,734	
Parker, CO	14.900	50,397	[e]	
Highlands Park, IL	21.000	56,000	[e]	Michael Jordan House
Windermere, FL	65.000	90,000	[e]	
Manhattan, NY	130.000	62,000	70,000[g]	River House
Total	1,026.981	1,376,683	175,424	
Mean	27.76[h]	35,300	4,498	

[a]Square feet main residence living area.
[b]Square feet other structures on property such as guest houses, poll houses, apartments, stables, garages, taken from published data or estimated from architectural guideline where square footage estimates were not published.
[c]The property description lists six additional one bedroom guest cottages. It is unclear from the information whether these are included in the square foot estimate.
[d]Unknown from listing.
[e]Appears to be included in Square Foot 1 as part of listing description.
[f]An interesting note on this house: it includes 11 miles of crown moldings.
[g]Equestrian Center, not included in house and guest house square foot estimate.
[h]This mean is for the 37 residences which had available price data.

Table 2. Luxury Car (>$42,000) Sales, MPG, and Aggregate MPG for Luxury Fleet of Cars Sold in the United States, 2015.

Model	Units sold	MPG	% sales	Relative MPG
Porsche	51,756	21	7.3	1.53
Cadillac	175,267	19	24.72	4.70
Lincoln	101,227	20	14.3	2.86
Jaguar	14,446	18	2.04	0.37
Land Rover	70,582	17	9.96	1.69
Aston Martin	1,160	16	0.16	0.02
Bentley	3,186	15	0.45	0.07
Maserati	11,697	16	1.65	0.26
Lamborghini	2,091	14	0.29	0.04
Ferrari	2,640	15	0.37	0.06
Mercedes E	20,995	21.5	2.96	0.64
BMW 5	23,578	20.5	3.33	0.68
Alfa Romeo 4C	663	26	0.09	0.02
Acura MDX	58,208	22	8.21	1.81
Audi S8/A8	4,990	20	0.63	0.13
Audi A7/S7	7,721	21	1.09	0.23
Audi Q7	18,995	18	2.68	0.48
Audi R8	495	15	0.07	0.01
Infiniti QX80	15,648	15	2.21	0.33
Infiniti QX70	5,737	15	0.81	0.12
Infiniti QX60	41,770	22	5.89	1.30
Lamborghini	756	15	0.10	0.02
Lexus GS	23,117	29	3.26	0.95
Lexus LS	7,165	20	1.01	0.20
Lexus LX	3,883	12.5	0.55	0.07
Lexus GX	25,212	15	3.56	0.53
Lexus RC	14,784	21.5	2.09	0.45
Rolls Royce	1,140	15	0.16	0.02
Total	708,909		100	19.59

Note. Car sales data are from the web site Left-Lane.com; MPG estimates come from U.S. EPA estimates, www.fueleconomy.gov.
MPG = miles per gallon.

Table 3. Top 10 Vehicles Sold, US, 2015, Most Cars Sold by Model.

Model	Units sold	MPG	% sales	Relative MPG
Hyundai Sonata	171,751	28/38 (31)	7.39	2.29
Ford Focus	180,287	29/40 (34.5)	7.76	2.68
Chevy Cruze	193,680	28/42 (33)	8.33	2.75
Ford Fusion	255,143	24/36 (28)	10.98	3.07
Honda Civic	277,538	31/41 (34)	11.94	3.88
Nissan Altima	283,372	27/38 (32.5)	12.19	3.96
Honda Accord	294,935	27/36 (30)	12.69	3.81
Toyota Corolla	306,693	30/42 (34)	13.19	4.49
Toyota Camry	361,111	25/35 (28)	15.54	4.35
	2,324,510		100%	31.28

Note. Sales data from Left-Lane.com.
MPG = miles per gallon.

Table 4. Average Gasoline Consumption, Variable and Rental Costs, Private Jets, US, 12 Most Popular Private Jet Models.

Model	Gasoline/hr	Variable cost/hr	Average rental cost/hr
Gulfstream 550	358	2,153	8,460
Global Express XRS	450	2,675	8,045
Falcon X7	318	1,918	7,965
Falcon 900	307	1,809	6,075
Gulfstream IV	479	2,929	5,884
Challenger 604	350	1,831	5,053
Citation X	336	2,080	4,533
Hawker 800	255	1,675	3,582
Citation Excel XLS	210	1,497	3,388
Learjet 60	207	1,432	3,347
Citation Mustang	100	610	1,674
Airbus A319	640	4,100	6,926