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Environmental Security and the Anthropocene: Law, Criminology, and International Relations

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Abstract

This article analyzes the implications of the Anthropocene for the gover-
nance of security. Drawing on environmental law, green criminology, and
international relations, the article examines the development of environ-
mental security scholarship over recent decades and shows similarities and
differences in perspectives across the three disciplines. It demonstrates that
the Anthropocene represents a significant challenge for thinking about and
responding to security and the environment. It argues a rethinking is needed,
and this can benefit from reaching across the disciplinary divide in three key
areas that have become a shared focus of attention and debate regarding se-
curity in the Anthropocene. These are, first, examining the implications of
the Anthropocene for our understanding of the environment and security;
second, addressing and resolving contests between environmental securities;

and third, developing new governance responses that mix polycentric and state-backed regulation to bring safety and security to the planet.

INTRODUCTION

Discovering the Anthropocene—the age of the human—has constituted an enormous rupture across the sciences and, more gradually, the social sciences. At the center of the Anthropocene are cascading ecological modifications that have been reshaping our planet and are pushing us against the boundaries of "safe operating spaces" (Rockström et al. 2009). The pervasive ecological and social challenges posed by the Anthropocene are thus new, rapid, and potentially irreversible and go to the very heart of our security and survival on earth (Kotzé 2014, p. 131).

Although far from a settled concept (Hamilton et al. 2015, Lidskog & Waterton 2016, Ruddiman et al. 2011), the Anthropocene signifies a new role for humankind: from a species that had to adapt to changes in its natural environment to one that has become a driving force in the planetary system (Biermann 2014, p. 57; Crutzen & Stoermer 2000; Steffen et al. 2015). Now that humans have been revealed as powerful "geological agents" (Chakrabarty 2009), the Anthropocene is prompting us to radically rethink our modes of existence (Latour 2014). An increasing body of work has accordingly examined, explored, and critiqued the concepts, consequences, and solutions within the Anthropocene. However, according to Lövbrand et al. (2015, p. 212), much of this work has been underpinned by "marginal and instrumental roles granted to the social sciences and humanities...dominated by the natural sciences and focused on environmental rather than social change" (see also Lidskog & Waterton 2016). This has led to increasing assertions like those made by Viñuales (2016, p. 5) that the Anthropocene "calls upon all disciplines, the entire body of human knowledge about the world, to analyze what is happening and how to face it." These rallying cries are demanding change and have already begun to change thinking around the important issue of security, particularly in fields such as law, criminology, and international relations, for whom a fundamental topic is safety and security (Harrington & Shearing 2017, Shearing 2015).

In the Anthropocene, law, criminology, and international relations scholars are beginning to accept that humans are shaping the future of the environment in ways that are not yet fully understood, and that our very security is determined by both our use of and enmeshment with the environment (Biermann et al. 2016; Dalby 2017, p. 243; Floyd 2015a; Gunningham & Holley 2016; Hulme 2009; Shearing 2015). Indeed, the safety and security that earth systems have provided to humans and our fellow species can no longer simply be regarded as the work of the environment or Nature, and as something that we humans must simply live with. National security is increasingly confronted by climate- and ecologically induced migration, resource wars, and even violent conflicts (Chalecki 2013, p. 4; Hamilton 2017, p. 580). Moreover, as humans are unmasked as a key geological and spatiotemporal force, difficult questions arise for how we incorporate the condition of the Anthropocene into security and whether and how humanity can secure itself from itself (Hamilton 2017, p. 580; Harrington 2017). As Dalby (2017, p. 235) nicely puts it, "Security too now needs an update!"

This article presents a discussion of the current status of the governance of security in the age of the Anthropocene. We begin by briefly mapping the development and general status of scholarship on security and the environment. We then outline the contours of the Anthropocene before charting where environmental security scholarship arising from law, criminology, and international relations disciplines is likely to be headed. We highlight three shared and important issues

arising from the Anthropocene that are currently challenging the three disciplines: rethinking the environmental security concept within the disciplines, managing contests between different environmental securities, and governing environmental security in response to the challenges posed by the Anthropocene. We conclude by summarizing a range of fundamental questions confronting environmental security scholarship in the Anthropocene.

In such a short article, we have necessarily been selective in our coverage of the rich discussions and debates on security and the environment across law, criminology, and international relationships. For instance, we focus primarily on security as it relates to the Anthropocene and focus less on distinguishing other framings, such as national security, human security, and international conflict. We also take a broad view of security and its connection to environmental issues across the three disciplines and do not address the full diversity of definitions and distinctions that arise within these fields, their subfields, or the emerging environmental security studies field (Floyd & Matthew 2013). It is true that the concept of security and its relationship to the environment has been of more explicit concern to international relations scholars than to those of law or criminology (Biermann et al. 2016; Dalby 2017, p. 243; Floyd 2015a; Hulme 2009; Shearing 2015). However, broad notions of security have been of interest to international environmental law and environmental regulatory scholarship, on which we focus, because they are concerned with governing and reducing harms to social and environmental systems (Hulme 2009, Kim & Bosselmann 2013, Kotzé 2014). The concept of security has also had influence, and been reflected, in criminological fields, particularly its green variant, which examines environmental harms, environmental laws, and broader law and social control systems (Lynch & Stretesky 2014; Ngoc Cao & Wyatt 2016; Ruggiero & South 2013, p. 359; Spapens et al. 2016; Zedner 2009). Overall, our analysis across these three disciplines is guided by, and seeks to align with, claims that security itself is an idea that should no longer be constrained to a single discipline (Ngoc Cao & Wyatt 2016, p. 415; Zedner 2009, p. 10). Perhaps more importantly, by emphasizing similarities, with due attention to broad differences across the three disciplines, we seek to begin the process of developing greater interdisciplinary interaction, which will no doubt be needed to respond to the challenges of the Anthropocene (Viñuales 2016, p. 5).

SECURITY AND THE ENVIRONMENT

The concept of security is nebulous, with few settled definitions (see generally Baldwin 1997). Because of this, the term can be differently understood within and across criminology, international relations, and law. At its broadest, security may be understood as the provision of conditions enabling diverse lives, social arrangements, legal and economic systems, and habitats (Dalby 2017, p. 235). Such understandings roughly accord with criminological views of security, which emerge out of a history of coupling security with safety in a process of "securing conditions that will promote…the presence of credible assurances of safe spaces within which people can live, work and play" (Shearing 2015, p. 260).

In recent decades, the security concept has become more complex, with increasing links to numerous scales and issues, not least the concerns of nation states (Dalby 2017, p. 235). So-called national security remains the core domain of the international relations literature. With the end of the Cold War, states increasingly focused on defense and protection against threats of danger, loss, or harm, such as war or violent conflicts (Dalby 2017, p. 235; Neocleous 2008; Rothschild 1995). In this context, international relations scholars have critiqued and focused on, among other things, processes of securitization that are often used to justify the use of emergency powers to govern such dangers (Buzan et al. 1998; Floyd 2010; Shearing 2015, p. 260). National security has also been a concern for international lawyers; however, the term security has rarely assumed

a precise legal definition, so there is a tendency for law to leave others to define this fluid concept (Hulme 2009, p. 4).

In recent decades, security has been layered with additional environmental concerns, with the environment becoming both an object to be protected and a source of insecurity (Dalby 2017, p. 235; Floyd 2015a; Hulme 2009, p. 8; Levy 1995; McDonald 2013). Given the diversity of security understandings outlined above, it is of little surprise that environmental security is also said to be a "polysemous" and contested concept, with a wide range of analytical and normative meanings (Floyd & Matthew 2013, p. 1; Hall & Farrall 2013, p. 126).

For states and some international relations scholars, there has been a growing interconnection of Hobbes's "low politics" of the environment with the "high politics" of state survival [Chalecki 2013, p. 4; see also Brodeur's (1983) "low and high policing"]. This has been driven by a geopolitical focus on the environmental impacts of military activities and wars, and of the environment as a cause or contributing factor to hazards, migration, crises, and conflicts (Brauch 2008, p. 31). Environmental security has also included broader understandings, such as legal scholar Hulme's (2009, p. 25) explanation of the term as capturing "the environment's ability to impact on human security and man's ability to impact on the stability and viability of the biosphere." Similar definitions can be found in green criminology [e.g., see Shearing's (2015, p. 261) description of environmental security as an "umbrella term" for "water security," "energy security," "food security," and "climate security"] and international relations [e.g., see Dalby's (2002, p. 60) description of "developing an economic system that reduces dependence on a single resource, a dynamic system that can accommodate change"]. Given this tapestry of terminology, it is perhaps sufficient to note that in approaching environmental security, much depends on "who you ask," and in particular on their views of "who or what is protected from who or what?" (Hulme 2009, p. 8).

Regardless of definitional disagreements, the history of modern environmental security (for further details, see Chalecki 2013, Dalby 2002, Floyd & Matthew 2013) can be traced back to the 1970s and the rise of environmental law and environmental thinking (e.g., Carson 1962, Ehrlich 1968). At the national level, this saw the initial creation of major environmental legislation and agencies in the United States, Australia, Canada, and Britain (Gunningham & Holley 2016, Hulme 2009). These actions reflected a view that threats to security came not just from external sources, such as other nation states, but also from relationships between people and the environment (Brown 1977; Hulme 2009, p. 5). From this national level, scholars and practitioners were increasingly part of a movement to broaden the scope of security at the international level to encompass a range of nontraditional harms, including environmental degradation, health, development, and human rights. Scholars such as Ullman (1983) set out to "redefine security." Subsequently, international action on environmental issues—such as the Brundtland report in 1987—began to note links between environmental stressors, conflict, and political tension (Hulme 2009, p. 5; World Comm. Environ. Dev. 1987, chapter 11). This built upon, and was followed by, actions of groups of states mobilizing through treaty-based international rules and global earth summits (e.g., Stockholm in 1972, Rio in 1992, and Rio+20) to address problems such as trade in endangered species, pollution from ships, biodiversity, and climate change. Environmental laws and rules were developed and overseen by international organizations, such as the United Nations Environment Program (Kelemen & Vogel 2010), that recognized that states wanting to deal with environmental issues in their own countries needed to cooperate with others on the world stage (Chalecki 2013; Holley 2017, p. 743; Vidas et al. 2015).

As security was increasingly linked to environmental issues, the concept of human security began to emphasize that security necessitated a more holistic approach. This approach referred to peace, security, and sustainable development and focused not just on the state but also on community and individual levels. The Global Environmental Change and Human Security project

that operated between 1999 and 2010 facilitated, supported, and to some extent institutionalized research on global environmental change and human security (O'Brien & Barnett 2013). This project recognized that environmental change was "a social problem with environmental characteristics, rather than an abstract scientific problem that can be disarticulated from social processes" (O'Brien & Barnett 2013, p. 375; Barnett et al. 2010, Schnurr & Swatuk 2012, Watts 2013).

Concepts such as human security began to break down state monopolies and broadened the focus on a wider range of people and things as both agents and subjects of security (Koff & Maganda 2016, p. 656). This included a rise in the application of security in the context of resources, such as water, food, energy, and climate. Although resource scarcity, plenty, and conflicts had been a concern of security studies for some time (see de Soysa 2013, Homer-Dixon 1994), the focus on human security saw natural resources and their ecosystem services being recognized as both drivers of insecurity and spaces for fostering security (Chalecki 2013; Hall & Farrall 2013; Simpson 2013; United Nations 2012, 2015). Each resource has its own lengthy history, but as with environmental security, concepts have broadened over time (beyond simply focusing on resources themselves) to include environment and sustainability aspects. Water security provides a nice illustration of this point. As Cook & Bakker (2012, p. 97) show, water security evolved from an initial focus on quantity and availability for human use to encompassing concerns about human health, human needs like food, and ecological sustainability concerns (Ait-Kadi & Lincklaen Arriens 2012, Harrington 2015).

Like water security, energy security was also traditionally thought about and governed separately from environmental sustainability. It is only recently, and to a narrow extent, that the relationship between the two has been seriously explored, in part due to growing awareness of global greenhouse gas pollutants (Gunningham 2013, p. 185; Holley & Lecavalier 2017, pp. 379–80; Int. Energy Agency 2014, p. 13; Sovacool & Dworkin 2015; United Nations 2015). The term has come to be described as an "umbrella concept" (Winzer 2012, p. 36), which, depending on its context, can embrace various dimensions, including environmental "stewardship; infrastructure; and efficiency, accessibility, reliability, and affordability of energy" (Ang et al. 2015; Int. Energy Agency 2014, p. 13). Food security, which emerged in the 1970s in response to an identified food supply crisis, has also shifted from emphasizing a "situation in which all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food" (Food Agric. Organ. 1996) to also incorporating sustainability issues, such as waste and environmental impacts that arise throughout the food supply chain (Berry et al. 2015, Lang & Barling 2012, Songstad et al. 2014).

Layered on top of and intertwined with water, energy, and food security concepts has been emerging thinking around climate security. It too has many "different and often competing ideas" (Floyd 2015b, p. 123) but includes notions of violent conflict (e.g., as a result of mass forced migration), national security (e.g., dealing with rising sea levels), crime and inequality (Agnew 2012; South 2014, p. 6), threats to individuals (e.g., crop failure due to adverse weather), and threats to ecology (such as changes to global ecology) (Floyd 2015b, pp. 123–25; McDonald 2013, pp. 42, 48).

Notwithstanding this proliferation of securities, much of the focus across these various concepts has remained concentrated on the nation state. Indeed, environmental security literature (broadly conceived) has often made the case for placing the environment within the national (i.e., US) security discourse. Such approaches tend to foreground the connections between conflict over scarce resources and social breakdowns caused by environmental degradation (e.g., Homer-Dixon 2007). Subsumed within this logic, the focus has often remained on whether and how environmental issues are security threats. Butts (2014, p. 272) aptly illustrates the link between national security and the environment through examples such as the Cherobyl nuclear disaster; Haitian immigrants fleeing environmental disaster; overpopulation and competition for resources in Rwanda, leading to mass violence and death; and food security issues in Somalia, among others. Koff (2016) has also recently shown how attempts to commit to human and environmental security at national and more

international scales has tended to remain driven by interests of member states, which are broadly based on domestic incentives and national security objectives. Similar trends are evident (and critiqued) in the context of environmental insecurities that cause crime and inequality and challenges for border security (Agnew 2012; Ngoc Cao & Wyatt 2016, p. 415; South 2014; White 2014).

Certainly these processes of securitizing environmental harms served to elevate the issue and gain the attention of policy makers, but they remained centered on security as a public good provided by the government allocating scarce resources (Holley 2017, Johnston & Shearing 2003, Kotzé 2014). At the core of this Westphalian view of the world has been a traditional (although increasingly challenged) belief that states understand security and environmental problems clearly, that these problems can be defined in advance, and that each problem has afflicted relatively stable systems (Garmestani et al. 2014; Holley & Sofronova 2017, p. 129). As Corry (2014, p. 256) explains in the security context, this was a view defined by "defense" and "neutralizing a threat." It assumed the goal was the preservation of already existing things, rather than actively adjusting, responding, and refabricating within challenging and varied conditions (Corry 2014). Such assumptions, as applied to environmental contexts, saw states exercise their exclusive authority, typically using uniform and mandatory rules, either to try and halt degradation and return ecological systems to their prior "pristine" natural state—in this case safe, stable, and secure existence for humans—or to pursue increasing border protections and security plans (Cosens et al. 2014, p. 3; de Búrca et al. 2013, p. 730; Garmestani et al. 2014, p. 1; White 2014).

As we discuss below, this way of thinking about the environment and security may no longer be suited to the challenges of the Anthropocene, not least because it privileges what has been arguably an ineffective state-centered approach (Kotzé 2014) and lacks understandings of the contextual, nested, uncertain, and dynamic nature of environmental and social conditions likely to arise in the Anthropocene (Cosens et al. 2014; Garmestani et al. 2014, p. 1; Steffen et al. 2015).

Some recent developments within the environmental security field have begun to recognize these and other concerns, leading it to expand in various directions. Pioneering work by Barnett (2001), Dalby (2002), Floyd (2010), and others has shown how environmental security is an essentially constructed (and therefore political) concept. Green criminologists have similarly focused on environmental security and the political economic structures of capitalism (Lynch et al. 2013; White & Kramer 2015, pp. 384–85). White (2014, p. 835), for instance, critiques a version of environmental security as linked to the fortress mentality of individuals, social groups, communities, nations, and the Global North. Such steps to take apart the fixed and abstracted definitions of security have allowed scholars to examine how different political communities understand security in different ways and how those communities might change their understanding of security over time. Such work has underscored how different depictions of security and threat serve to produce particular responses to those issues in practice (McDonald 2012). Likewise, scholarship focused on environmental peace building has proliferated and evaluated how cooperation over shared or vulnerable resources can create pathways toward peace and reconciliation (Krampe 2017).

It is from this recent thinking that the Anthropocene has begun to be absorbed into small corners of legal, criminological, and international relations scholarship on security. In what follows, we briefly outline the Anthropocene and its impact on the social sciences before turning to the emerging challenges it raises for environmental security.

THE ANTHROPOCENE

Humans have thrived on earth during a temperate climatic period on the planet that geologists have dubbed the Holocene, meaning "wholly new." This short period of approximately 12,000 years since the last Ice Age has seen us reach into every corner of our planet as we have

created safe spaces for ourselves in which to live, work, and play (Harrington & Shearing 2017). Enabling this accomplishment has been a planetary infrastructure of "ecological services" (Costanza et al. 1997) that have sustained us as biophysical beings.

For us as humans, these services were conceived of as Nature, a realm that we took advantage of, took for granted, and thought we did not—and indeed could not—influence. Certainly, many indigenous peoples had conceptions and rules that recognized our interconnectedness with the natural world (Adamson & Davis 2017; Valverde 2017; Williams 2013, p. 261), but what many in the Global North barely glimpsed, and did not fully understand or acknowledge, was that Nature constituted our biophysical security. Without Nature, there would be no us.

While we lived in and took advantage of Nature, our realm of accomplishment was "the social" (Rose 1996). Durkheim (1950) conceived of this domain of existence as an independent realm that we constituted and that was entirely apart from biophysical Nature—two sui generis realities. It was within this way of seeing the world that law, criminology, and international relations emerged. The natural sciences studied Nature, whereas social scientists studied the results of the human work that constituted the social worlds within which we had our being as "social animals" (see Harrington & Shearing 2017, p. 48). Within this conception, humans, as earthlings, had been influential in shaping the social world, but with respect to the world of Nature we have been, in Harari's (2014) words, decidedly "insignificant animals."

This framing has quite suddenly been overturned via a "collapse of nature into society" (O'Malley 2018), a collapse that was admittedly a long time in coming. This idea was foreshadowed by many early and more recent environmental thinkers who positioned Nature as relevant to society (e.g., Carson 1962, Darwin 1859, Leopold 1949, Lovelock 2006, Singer 1975, White et al. 2016, Williams 2013). Notwithstanding this body of environmental thought, humans have long been rapacious consumers of "ancient stored sunlight" (Hartmann 2013) as a source of energy to enhance our well-being.

With the advent of the Industrial Revolution an acceleration commenced, driven by a contingent coupling of a fossil fuel (initially coal), the steam engine, and manufacturing of goods through machines (Marks 2006). What we did not realize initially, but now know, is that through our harnessing of fossil fuels, and the release of carbon into the atmosphere that this involved, we humans became, virtually overnight, very significant animals indeed. So significant that we have become influential geological actors (Chakrabarty 2009) who not only are part of Nature but have fundamentally shaped planetary systems. This is exemplified by anthropogenic climate change and a veritable array of declining indicators of biodiversity and ecosystem health (Clarke 2014, Steffen et al. 2015, UN Environ. Progr. 2012). The "unintended consequence" (Merton 1936) of our actions has been to fundamentally undermine the "safe planetary space" upon which our well-being had depended in huge and consequential ways (Holley & Shearing 2018b).

In doing so, we have placed our survival, and that of other earthlings, in jeopardy (Lovelock 2006). This, in Klein's (2014) telling words, "changes everything." For law, criminology, and international relations more generally, this means that we now need to rethink our most foundational assumptions. We can no longer treat our "safe planetary space" as independent of us. We can no longer treat the harms that we have previously attributed to Nature—"natural" disasters—as natural. These harms, and the planetary boundaries that we have relied upon for our safety, must now be "problematised" [Foucault 2008 (1980)] in radically new ways. What earth scientists have recognized (Crutzen 2002), and what law, criminology, and international relations must now recognize, is that Nature is in large part a human accomplishment. This recognition has given rise to the claim that the earth has now entered a new geological age, a human age, the Anthropocene.

The naming of the Anthropocene serves to indicate a recontextualization of human history as "a mere moment in Earth's deep time," while insisting that we acknowledge the profound

consequences of the scale and speed of the global change that human actions have wrought (Beck 2014, pp. 404–5). Responses to the proclamation of this new human age have varied significantly (see Corlett 2015, p. 38; Dalby 2017). Some view the Anthropocene and its consequences in a "negative" light (Hamilton 2015); others see "bright spots" (Bennett et al. 2016); and still others have come to focus their attention on a new awareness, succinctly captured by Steffen et al. (2011, p. 756): "'Business-as-usual' cannot continue." It is this latter view that underpins this article, and it suggests that our collective approach to environmental security research and practice must change (Corlett 2015, p. 38).

GOVERNANCE RESPONSES TO SECURITY IN THE ANTHROPOCENE

The Anthropocene can, and should, be tackled by environmental law, green criminology, and international relations, and the following section unpacks and interrogates various aspects of this challenge. We lay out three emerging trends and challenges for the governance of environmental security that are shared across law, criminology, and international relations: first, the implications of the Anthropocene for a rethinking and expanding of environmental security in these fields; second, the challenge of resolving multiple contests between water, energy, food, and climate securities; and third, the design of new governance of security responses to address the challenges of the Anthropocene.

The Implications of the Anthropocene for Rethinking and Expanding Security

Given the nascent nature of the Anthropocene concept itself, there is presently little agreement about the extent to which the Anthropocene fundamentally changes understandings of environmental security across the three disciplines, nor is there consensus on the precise forms of change. However, there is evidence that the Anthropocene is pushing the boundaries of all three disciplines (South 2014, p. 15).

As noted above, acknowledging that humans transform the function of the planet does not simply mean there are new and interconnected threats with which we must deal (although this is an important governance issue, which we discuss below). For scholars within law, criminology, and international relations, it also means dealing with a dissolving of boundaries between human and Nature. This impacts upon security's general frames of reference and may unsurprisingly lead to a reckoning of sorts within some environmental security circles (cf. Dalby 2017, Floyd 2015b, Shearing 2015, South 2015).

No matter whether adopting a critical or traditional approach, environmental security has almost always (bar its stronger ecological variants) been defined in anthropocentric terms. The key goal of security discourses—whether survival, safety, power, or emancipation—has remained human centered. As noted above, the Anthropocene fundamentally disrupts (or at least redoes; see Lidskog & Waterton 2016, Lövbrand et al. 2015) a distinction between human and Nature upon which all discourses of security have hitherto relied. This disruption has begot responses that move in different, though sometimes complementary ways, including probing inquiries into the referent objects of security (e.g., state, society, individual) and ontological critiques of internal versus external threats (i.e., of self and other), subject and object, and nature and culture and subsequent calls for fundamental reshaping of security and even the disciplines themselves (e.g., Fagan 2016, McDonald 2017). For present purposes, we highlight two broad, overlapping, but exemplary groupings of emerging thought across the three disciplines.

First is a set of arguments that sees the Anthropocene as calling for a deepening and opening up of environmental security. In the international relations field, for example, Mitchell (2014) argues

that because threats are distributed across, and emerge from, complex worlds, scholars must build a "worldly conception" of security. This entails embracing (among other things) weak forms of anthropocentrism in which the "anthro" is seen as only one part in a lively assemblage. Opening up security in this way allows us to make thinkable worldly forms of harm so that they can be made amenable to human forms of action (Mitchell 2014). Related responses from international relations scholars include the pursuit of posthuman forms of security, which highlight how humans and humanity are socially and culturally constituted categories, which might entail examining how technologies, animals, and everyday material objects impact our ideas and practices of security (Cudworth & Hobden 2011; see Harrington & Shearing 2017 for a discussion).

This broader view of environmental security is echoed by Shearing (2015) in criminology, who argues that it must move beyond an exclusive focus on human-to-human engagements to include thing-to-human and human-to-thing engagements. Marks et al. (2018, p. 150) similarly emphasize this connectedness in their suggestion for a new and creative understanding of the complex interconnections between security, technology, humans, and the environment as, in their words, "righting the Anthropocenic trajectory relies upon the construction of bridges, connections, relationships and feedback loops, rather than their destruction."

Legal scholars such as Kotzé and Grear (see also Robinson 2014) appear to share a similar desire to expand security thinking to wider conceptual understandings and their normative ends. Kotzé (2014, p. 154) argues for ecocentrically orientated revisions to definitions of sustainable development to include the security of people and the planet. This would focus on not just meeting the needs of the present but also safeguarding earth's life-support system. Grear's (2015, p. 246) critical legal examination of the *anthropos* and the contemporary dominance of the capitalist corporate person similarly leads her to call for "the flourishing of plural, multi-layered eco-subjectivities" in the Anthropocene. As Schilling et al. (2017, p. 111) suggest, such work appears directed toward a more environment-centered (as opposed to human- or state-centered) type of environmental security, where implications for humans can be considered but are not the primary focus. Instead, concerns about losing biodiversity, crossing ecological tipping points, or disrupting crucial ecosystems are frequently articulated (McDonald 2013, p. 48; Schilling et al. 2017). Such concerns echo discussions of ecological security, which have yet to, but may well in an Anthropocene future, impact significantly on policy and academic debates (McDonald 2013, p. 49; 2017).

The second grouping of thought offers a more explicitly fundamental challenge to environmental security studies and the three disciplines themselves. Emblematic of this thinking in international relations is work by Burke et al. (2016), who argue for the "end of international relations" and its replacement with what they label as "planet politics." Planetary forms of politics can encompass not only the immense threats from environmental change but also the ontological interference that makes thinking the Anthropocene impossible. In similar fashion, Harrington & Shearing (2017) argue for a relational form of ethical sensibility built upon repurposed notions of care to enable security scholarship to respond to the Anthropocene.

Although legal scholars have yet to call for an end to jurisprudential thinking, they have begun to challenge what many would take as central dimensions of legal thought and security. Viñuales (2016, p. 2), for example, prompts us to rethink law's role in legitimizing systems that are based on human agency conceptions that are now challenged by the Anthropocene: "Modern conceptions of liberty and equality and the articulation between these two fundamental values are based on a culture of 'progress,' understood as the human ability to increasingly push back natural constraints." Viñuales challenges lawyers to rethink foundational values translated by existing legal systems, such as ideas of sovereignty (a fundamental cause of the climate mitigation collective action problem), the corporate form (enabling accumulation of capital), and international trade. Vidas et al. (2015) and Kotzé (2014) also draw attention to challenges of state sovereignty and

national security, asking whether the emergence of the Anthropocene raises a question of amending fundamentally, or rejecting, aspects of state sovereignty so central to environmental and natural resource law and security (Vidas et al. 2015, p. 7).

In the context of criminology, debates have occurred over its own reshaping in response to the Anthropocene. As a range of scholars have argued, the nature of criminology and its presumptions have arguably already been shifted by environmental security (Ngoc Cao & Wyatt 2016, p. 415; Zedner 2009; cf. South 2015). However, Shearing (2015) has argued that the Anthropocene calls for a rethinking of criminology as a security-ology, which will build on and embrace a broader set of harms (see also South 2015), a wider set of "auspices" and "providers" of security governance, and a more forward-looking focus that anticipates and preempts the realization of harms. Floyd (2015a, p. 276) has countered that it is "analytically weak" to describe all political practices concerned with achieving security as a state of being as security practices. Further, she notes that "[e]levating environmental issues to security problems does not necessarily produce a more secure environment for people." At the same time, Ngoc Cao & Wyatt (2016, p. 425) retort that the integration of security and green criminology is "theoretically logical, pragmatically achievable and productive." O'Malley (2018, p. 110) appears to agree with this view and has offered his own vision of environmental security as "harm minimisation—whether by harm prevention or through mitigating or compensating for harmful actions." At his strongest, O'Malley (2018, p. 115) has suggested that perhaps "criminalisation and criminology should be allowed to slide into irrelevance rather than strengthened 'as if' they offer solutions in an age of social harms."

Given the relatively small uptake of the Anthropocene concept, it is necessary to ask whether it is possible to conceivably reorient the conception of environmental security toward one that hinges upon a deep relationality between humans and the earth—one that entangles Nature and society. As the above groups of thought and debates signal, it is no easy task to conceive of security as something not distinctly human. The above nascent generation of thoughts shared by the three disciplines points us in creative, useful, and sometimes contradictory directions. This new theoretical and empirical scholarship is slowly grappling with alternative forms and discourses of environmental security that are immanent within these exceptional times. Future inquiries into the state of the world—and the role of law, criminology, and international relations in (re)producing it—should and no doubt will continue to radically probe the security problematique and confront how entangled forms of life disrupt or solidify it.

Moving from Contested to Integrated Environmental Security

As the Anthropocene has revealed, human interference in all aspects of Nature, including the production of the land for food and the extraction of natural resources for energy, has triggered significant changes and uncertainty about long-term planetary effects (Diamond 2005). One of the consequences is the recognized need for more holistic views of the environment that go beyond separate spheres and see all issues as interrelated (Kotzé 2014, p. 147). As Hamilton (2017, p. 1) (and indeed many in law, criminology, and international relations noted above) now recognizes, humanity and Nature are "entangled" across "a myriad of scales, spaces, being(s), and temporalities," which has a profound impact upon our understanding of mitigating against future catastrophe. This poses a major challenge for dealing with the myriad of sector-specific securities that have emerged in the environmental space, namely, food, water, energy, and climate security and the influence of global environmental change on the governance of these domains (Hospes & Brons 2016, Songstad et al. 2014, World Econ. Forum 2011).

Energy, water, food, and climate are the pillars on which our society and security rest. Yet the Anthropocene threatens the accessibility and reliability of these existing water, energy, food, and

climate supplies. In this new and unknown world (Beck 1992), ensuring security within each of these sectors (e.g., dealing with scarcity or plenty) will remain at the forefront of the global agenda (Dodds & Bartram 2016). Yet, so intertwined are these issues that pressures in any one sector increasingly produce tensions in others. For example, although climate change is likely to increase the prevalence of water scarcity, its mitigation through renewable energy and afforestation can create new competition for food-producing water and land (Sage 2013, p. 75). The impact of so-called bridging fuels, like unconventional gas and fracking, can similarly compete with or pollute water used for agriculture and urban supply systems.

Addressing these contests and connections between sectors is largely an underappreciated and underexplored aspect of environmental security thinking across criminology, law, and international relations. There has been some nascent consideration via human security's recognition of diverse sets of risks (Kline et al. 2017; O'Brien & Barnett 2013, p. 375; see also Sustainable Development Goals, United Nations 2015), holistic system integration and management recognized in environmental law (e.g., Cook & Bakker 2012 and Holley & Sinclair 2018 discussing this in the water context), and some acknowledgment of the interconnections and impacts (Hall & Farrall 2013, Simpson 2013). Nevertheless, it is far more common to focus on one sector of security and its ability to win out over others. As Bakker & Morinville (2013, p. 4) explain regarding water security, the focus is on "water protection as the ultimate goal, and something that cannot often not be compromised on" (cf. integrated water resource management, Cook & Bakker 2012). Similarly, as McCollum et al. (2013, p. 480) illustrate for energy security, the common practice of narrowly focusing on singular energy policy issues ignores potentially enormous synergies, quite often leading to the implementation of shortsighted solutions that may have unnecessarily costly, long-term consequences. Bazilian et al. (2011) further set out examples from both developed and developing countries where policy imperatives to enhance energy access have failed to appreciate wider impacts and concerns from multiple perspectives; for example, in Uganda and Ethiopia, the reliance on wood as a source of fuel has led to climate-impacting deforestation (see also Parker & Stewart 2014, p. 58; Sovacool & Dworkin 2015). Such challenges are also evident in the context of food security, where broad policy support for increased agricultural production (including water and energy subsidies and price guarantees on crops) leads to sharp increases in the demand for water and energy, as well a myriad of other problems, including contamination, pollution, biodiversity loss, and salinization (Rasul 2016). This sector-specific approach to security has largely been characterized by disentanglement of humans from Nature (Hamilton 2017) and the disentanglement of policy responses to deal with their complex interaction.

These brief examples highlight that humans can no longer be thought of as "unbounded and outside nature" (Harrington 2016, p. 494). The structure of current policy frameworks, which typically isolate one or two forms of security, sees a range of costs and consequences unaccounted for—in particular, environmental but also social and economic costs. Accordingly, thinking of security in terms of "specific referent objects and physical threats" (Hamilton 2017, p. 582)—in other words, in discrete categories of food, water, energy, and climate security—is problematic. As Hamilton (2017, p. 583) elucidates, "safety is secured not simply by avoiding violent physical conflict per se, but by recognizing the shockwaves and ripples in spacetime that entanglement implies."

Fortunately, there is a growing recognition of such connections between energy, water, food, and climate, sometimes termed the energy–water–food–climate nexus, and this has led to increasing international and national consensus that governing this nexus is one of the defining challenges of our time (Mohtar 2016, World Econ. Forum 2011). To date, because of the vastness of the concerns arising, and the difficulties of considering the various sectors together, there have been few practical successes at meaningfully implementing nexus thinking in governing food, water,

energy, and climate (Biggs et al. 2015, p. 389). In particular, approaches to the nexus tend to be driven by the "perspective of the policy maker" rather than whole-of-system approaches:

> If a water perspective is adopted, then food and energy systems are users of the resource...from a food perspective energy and water are inputs...from an energy perspective, water as well as bio-resources (e.g., biomass in form of energy crops) are generally an input or resource requirement. (Bazilian et al. 2011, p. 7897; see also Hussey & Pittock 2012)

Overcoming this challenge and embracing and interrogating this nexus will be central to the future of environmental security. Indeed, a failure to attend to these interconnections between securities will threaten environmental security writ large—understood here as the stability and viability of the biosphere that provides our safe operating space. As Dalby 2017 (p. 246) puts it, "What matters in terms of human life are the processes that supply food and water and other 'ecological services.'" Energy, water, food, and climate are now central to the "series of assemblages" that make modern life possible in the global system (Dalby 2017, p. 246).

Recognizing the irreconcilability, and in turn developing constructive understandings so we know where and how food, energy, water, and climate can help achieve broader environmental security goals, is fundamental (Kline et al. 2017, p. 571). This will require further clarifying the implications of the nexus, including critical linkages, and striving toward more whole-of-system approaches (Rockström et al. 2014, p. 1257). And as we discuss below, there are emerging signs of these types of restructured and reoriented governance architectures that may overcome the compartmentalization that has previously defined environmental security thinking and practice (Heubaum & Biermann 2015).

Governance of Environmental Security in the Anthropocene

In an age of cascading, interconnected ecological change and new, more uncertain threats from floods, droughts, mass extinctions, and mass migration, there is a recognized need to consider and rethink the governance of environmental security. There is no clear agreement on where and what must be done to enhance such security. However, a section of law, crime, and international relations scholars are increasingly focusing on governance responses to the environmental security challenges of the Anthropocene (see, e.g., Biber 2017, Biermann 2014, Galaz 2014, Holley & Shearing 2018b, Kotzé 2016, Vidas et al. 2015, Nicolson & Jinnah 2016).

Across this scholarship, no single definitive model can presently be identified as the silver bullet to the Anthropocene and its environmental insecurities (broadly conceived). However, particular mentalities and design features are shared across many of the governance proposals sketched out below. As we highlight, there are two broad groups of responses, one that is more polycentric and another that looks to the greater use of state-backed legal controls.

As noted above, conventional responses to security were underpinned by a state-centered and top-down view of the world. One group of scholars views as necessary a shift beyond this to embrace more polycentric, multilevel forms of governance, involving a greater multitude of auspices and providers of environmental security (see, for example, Bayley & Shearing 2001). One such proponent is Frank Biermann and others involved in the Earth System Governance project. For these thinkers, the Anthropocene requires a repurposing of global institutions to attune them to ecological threats (Biermann et al. 2016). This requires attention to effective local and national governance but, crucially, much stronger coordination and support through global institutions and intergovernmental cooperation, given the high connectivity of problems (Biermann et al. 2016, p. 347). This approach demands the bringing together of different communities—local, national,

and international. Biermann et al. (2016, p. 347) call for a redefinition of existing governance systems to include more "local and regional contextualized governance solutions within a planetary frame of references."

Similar polycentric governance trends are evident in and sometimes embraced by environmental law (Kotzé 2014) and its regulatory cousin (Gunningham & Holley 2016). One line of thought currently gaining some currency is ideas of experimental and new governance at local and global levels. This approach emphasizes collaboration between a diversity of private, public, and nongovernment stakeholders and relies heavily upon participatory dialogue and deliberation, flexibility, inclusiveness, multilevel and integrated approaches, knowledge generation, and processes of learning and adaptation (see, generally, de Búrca et al. 2013, Holley et al. 2012).

Finally, as noted above, criminology has also embraced broader polycentric understandings of control and the role of nonhuman "actants" (Latour 2014; see Holley & Shearing 2018b). Here it has been recognized that the global nature of the Anthropocene will require new forms of governance, including proactive and intelligence-led policing (to respond to lack of immediate victims or visibility of many harms) and new levels of cooperation between local, national, and international agencies and between agencies and third-party enforcers, such as nongovernmental organizations (Spapens et al. 2016, p. 2).

In contrast to the more polycentric and multileveled governance response to the Anthropocene, a second group of responses have focused on the need for more top-down and state-backed regulation. Of concern here is identifying the agents of anthropogenic change, their responsibilities, and how blame should accordingly be apportioned for harms in the Anthropocene in the past, present, and future. Responsibility has been familiar stuff to criminology and indeed law (see Biber 2017, Viñuales 2016). For some lawyers, this could involve leveraging legal action by affording greater rights to Nature (Burdon 2010). Some (although not all; see O'Malley 2018) green criminologists have also suggested more rather than less law is needed to respond to the Anthropocene. This has often involved calls for the definition of a new crime of ecocide (Agnew 2013, Haines & Parker 2018). On this view, criminology is fleshing out precisely what Floyd (2015a, p. 281) suggests is needed from this discipline in the Anthropocene, namely, "thinking systematically about what crime means." Haines & Parker (2018) see similar value in criminogenic state-backed regulatory responses, as does Biber (2017, p. 1), who more broadly notes that "human responses to the Anthropocene will ineluctably lead to greater government involvement in a wide range of human activities." Scott (2013) provides a nice illustration of this in the context of geoengineering, where she argues for a new protocol to address this challenge under the 1992 United Nations Framework Convention on Climate Change.

In summary, although polycentric and state-backed responses to the Anthropocene may appear like two distinct governance visions, they are far from mutually exclusive, and indeed can be balanced with each other. As Gunningham & Holley (2016, p. 286) have noted, "where responses to the Anthropocene are still evolving. . .balancing and rebalancing different modes and dimensions of law, regulation, and governance to address problems will be needed."

CONCLUSION

Each of the challenges we have canvased point to a range of questions to be explored in environmental security scholarship for the Anthropocene age: What are the advantages and limits of opening up our understanding of environmental security to include a wider range of human and nonhuman considerations? Is there a need for a deeper rethink of fundamental notions, such as moving from criminology to security-ology, or international relations to planet politics—and what analytical purchase will this offer to the challenges of the Anthropocene? What will aspirations

of coordination, trade-offs, and integration across silos/sectors deliver for the practice of environmental security? What mixes and interactions between public, private, and nongovernment actors will be needed to respond to the integration and to the complex, dynamic, and uncertain challenges of the Anthropocene? And how, and in what ways, can law, criminology, and international relations better join in interdisciplinary labors to find solutions to and understand the Anthropocene and its security challenges?

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