


THE DEVELOPMENT OF CRIMINAL LAW ON ENVIRONMENTAL CRIMES: ANALYSIS OF LAW ENFORCEMENT FROM A GREEN CRIMINOLOGY PERSPECTIVE



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ABSTRACT

This article examines the evolution of criminal law concerning environmental offenses through the analytical framework of green criminology, with particular emphasis on law enforcement mechanisms and their effectiveness. The study analyzes the transformation of environmental criminal law from its nascent regulatory origins to contemporary comprehensive legal frameworks that recognize ecological harm as a legitimate subject of criminal sanction. Employing doctrinal legal analysis combined with green criminological theory, this research investigates how law enforcement agencies have adapted to address environmental crimes, including illegal waste disposal, wildlife trafficking, pollution offenses, and corporate environmental violations. The findings reveal significant gaps between legislative development and enforcement capacity, highlighting systemic challenges such as inadequate institutional resources, limited prosecutorial expertise, and the complex transnational nature of environmental crimes. This article argues that effective enforcement requires not only robust legal frameworks but also a paradigm shift toward recognizing environmental harm as a form of violence against both ecological systems and human communities. The study contributes to the growing body of literature on green criminology by providing a comprehensive analysis of the dialectical relationship between legal development and enforcement practice, offering recommendations for strengthening criminal justice responses to environmental degradation.

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1. INTRODUCTION

Environmental degradation has emerged as one of the most pressing challenges of the twenty-first century, demanding urgent responses from legal systems worldwide (White, 2018). The recognition of environmental harm as a criminal matter represents a significant evolution in legal thinking, moving beyond traditional civil and administrative remedies to embrace punitive sanctions for ecological destruction (Lynch & Stretesky, 2014). This transformation reflects a broader shift in societal values, acknowledging that environmental protection is not merely a regulatory concern but a fundamental imperative for human survival and intergenerational justice (Nurse, 2016). Green criminology, as an interdisciplinary field, provides a critical lens through which to examine environmental crimes and their enforcement (South & Brisman, 2013). Unlike traditional criminology, which focuses primarily on conventional street crimes and interpersonal violence, green criminology encompasses a wider spectrum of harmful behaviors that damage ecosystems, wildlife, and environmental quality (Brisman & South, 2019). This perspective challenges the anthropocentric orientation of conventional criminal law, advocating for an ecocentric approach that recognizes the intrinsic value of non-human nature (Sollund, 2019). The development of criminal law on environmental crimes has been characterized by significant heterogeneity across jurisdictions, reflecting varying political priorities, economic considerations, and cultural attitudes toward nature (Gibbs et al., 2010).

While some nations have enacted comprehensive environmental criminal statutes with substantial penalties, others continue to rely primarily on administrative sanctions and civil liability mechanisms (Hall, 2013). This disparity raises critical questions about the effectiveness of criminal law as a tool for environmental protection and the factors that facilitate or impede robust enforcement (Faure & Heine, 2015). Law enforcement of environmental crimes presents unique challenges that distinguish it from traditional criminal justice operations (White, 2011). Environmental offenses often involve complex scientific evidence, corporate defendants with substantial legal resources, and harm that may not become apparent for years or decades (Situ & Emmons, 2000). Moreover, environmental crimes frequently transcend national borders, requiring international cooperation and coordination among agencies with different legal frameworks and

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enforcement priorities (Elliott, 2012). The capacity of law enforcement agencies to detect, investigate, and prosecute environmental crimes is often constrained by limited resources, insufficient training, and the low priority assigned to environmental offenses relative to conventional crimes (Akella & Cannon, 2004). From a green criminological perspective, the enforcement of environmental criminal law must be understood within broader political and economic contexts (Lynch, 2020).

Environmental crimes are not randomly distributed but are systematically linked to patterns of capitalist production, consumption, and accumulation (Lynch & Stretesky, 2003). Industries that generate substantial environmental harm often possess significant political influence, enabling them to shape regulatory frameworks and limit enforcement efforts (Ruggiero & South, 2013). This structural reality creates what green criminologists term "state-corporate crime," wherein governmental failures to enforce environmental laws facilitate corporate environmental destruction (Kramer & Michalowski, 2006). This article contributes to scholarly understanding by providing a comprehensive analysis of how criminal law on environmental crimes has developed and how enforcement mechanisms have evolved in response to growing environmental threats. The research addresses three central questions: First, how has criminal law concerning environmental offenses evolved over time, and what factors have driven this development? Second, what are the primary challenges and limitations in enforcing environmental criminal law? Third, how can green criminological insights inform more effective legal and enforcement strategies? The significance of this inquiry extends beyond academic discourse, as the effectiveness of environmental criminal law has direct implications for ecosystem health, public welfare, and climate stability (Skinnider, 2011).

By examining the gap between legal provisions and enforcement realities, this study identifies critical areas for reform and highlights innovative approaches that have demonstrated success in particular jurisdictions (Du Réés, 2001). The analysis draws upon comparative legal research, criminological theory, and empirical studies of enforcement outcomes to provide a holistic assessment of the current state and future prospects of environmental criminal law. The article proceeds as follows: Section 2 outlines the methodological approach employed in this research. Section 3 provides a historical overview of the development of environmental criminal law, tracing its evolution from early conservation statutes to contemporary comprehensive frameworks. Section 4 analyzes the theoretical foundations of green criminology and its application to environmental law enforcement. Section 5 examines specific categories of environmental crimes and enforcement challenges. Section 6 discusses the gap between legal

development and enforcement capacity, identifying systemic barriers and potential solutions. Section 7 acknowledges the limitations of this study. Section 8 offers conclusions and recommendations for strengthening criminal justice responses to environmental harm.

2. METHODS

This study employs a doctrinal legal research methodology combined with critical theoretical analysis grounded in green criminological perspectives (Hutchinson & Duncan, 2012). The research design integrates multiple analytical approaches to provide comprehensive insights into the development and enforcement of environmental criminal law. The primary methodological approach involves systematic examination of statutory provisions, case law, and regulatory frameworks governing environmental crimes across multiple jurisdictions (Chynoweth, 2008). This doctrinal analysis focuses on identifying patterns in legislative development, examining how environmental offenses are defined, categorized, and sanctioned within criminal codes (Cryer et al., 2010). The research examines legal sources from common law jurisdictions (United States, United Kingdom, Australia, Canada) and civil law systems (Germany, France, Netherlands), as well as emerging economies with rapidly developing environmental law frameworks (Brazil, India, South Africa) (Farmer et al., 2015). Legal texts analyzed include national criminal codes, environmental protection statutes, international conventions and treaties, and judicial decisions interpreting environmental criminal provisions (Pearce & Tombs, 2019). This comparative approach reveals convergences and divergences in how different legal systems conceptualize and respond to environmental harm through criminal sanctions (Faure & Svatikova, 2012).

The study applies green criminology as both a theoretical lens and an analytical framework for understanding environmental crimes and their enforcement (Walters, 2010). Green criminology encompasses multiple theoretical strands, including eco-global criminology, conservation criminology, and species justice perspectives (Sollund, 2015). This research draws particularly on Lynch and Stretesky's (2014) "treadmill of production" theory, which examines how capitalist economic systems generate systematic environmental harm, and White's (2013) eco-justice framework, which emphasizes environmental rights and ecological citizenship. The green criminological approach enables critical examination of how environmental crimes are constructed, which harms are criminalized and which remain legal, and whose interests are served by particular enforcement priorities (Brisman et al., 2014). This perspective challenges conventional criminal justice assumptions by highlighting the anthropogenic drivers of environmental

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destruction and the disproportionate impact of environmental crimes on marginalized communities (Williams, 1996).

The analytical process involved three stages. First, legislative provisions were coded according to offense types, penalty structures, mens rea requirements, and corporate liability provisions (Schünemann, 2000). This coding enabled identification of temporal trends in legislative development and cross-jurisdictional patterns. Second, enforcement data was analyzed to assess prosecution rates, conviction outcomes, sentencing patterns, and the relationship between legislative frameworks and enforcement outcomes (Clifford & Edwards, 2012). This quantitative analysis was supplemented by qualitative examination of enforcement challenges documented in agency reports and academic studies. Third, findings were interpreted through green criminological theory to identify structural factors shaping both legal development and enforcement practice (Halsey, 2004). This interpretive stage examined how political economy, regulatory capture, and environmental justice concerns influence the criminalization and enforcement of environmental harms.

The doctrinal approach, while valuable for understanding formal legal structures, cannot capture informal enforcement practices, discretionary decision-making, or the gap between law in books and law in action (McBarnet, 2006). The comparative analysis is necessarily selective, focusing on jurisdictions where English-language sources are accessible and where enforcement data is publicly available (Pring & Pring, 2016). Green criminological theory, while providing valuable critical insights, represents one among multiple possible analytical frameworks for understanding environmental crimes (Goyes & South, 2017).

3. DISCUSSION

3.1 Historical Development of Environmental Criminal Law

The evolution of environmental criminal law reflects changing societal understandings of the relationship between human activities and ecological systems (Burns & Lynch, 2004). Prior to the twentieth century, environmental protection was largely limited to property-based protections and resource conservation for human use (Lazarus, 2004). Early environmental statutes in Britain and the United States focused on nuisance abatement and public health concerns arising from industrial pollution, rather than recognizing environmental harm as inherently criminal (Dewey, 2000). The modern environmental criminal law framework emerged in the 1970s, catalyzed by the environmental movement and growing scientific evidence of ecological degradation (Lazarus, 2004). In the United States, the Clean Air Act (1970), Clean Water Act (1972), and Resource Conservation and Recovery Act

(1976) introduced criminal penalties for environmental violations, marking a significant departure from purely administrative enforcement approaches (Situ & Emmons, 2000). These statutes established criminal liability for knowing violations of environmental regulations, creating a new category of regulatory crimes distinct from traditional common law offenses. European jurisdictions followed similar trajectories, with Germany's Environmental Criminal Act (1980) and the United Kingdom's Environmental Protection Act (1990) establishing comprehensive frameworks for prosecuting environmental offenses (Heine, 1998).

The European Union's Environmental Crime Directive (2008) harmonized minimum criminal penalties across member states, requiring criminalization of specific environmental harms including water pollution, waste disposal violations, and wildlife trafficking (Faure & Heine, 2015). The development of international environmental criminal law gained momentum through conventions addressing transboundary environmental harms (White & Heckenberg, 2014). The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes (1989), the Convention on International Trade in Endangered Species (CITES, 1973), and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) established international legal frameworks requiring domestic criminal enforcement (Gibbs et al., 2010). These instruments recognized that environmental crimes often transcend national boundaries, necessitating coordinated international responses. Contemporary environmental criminal law has expanded beyond pollution control to encompass diverse offense categories including illegal logging, wildlife trafficking, illegal fishing, ozone-depleting substance smuggling, and carbon credit fraud (Wyatt, 2013). This expansion reflects growing recognition that environmental crimes are not marginal activities but constitute significant threats to biodiversity, climate stability, and human security (Nellemann et al., 2014).

3.2 Theoretical Foundations of Green Criminology

Green criminology emerged in the 1990s as a critical response to mainstream criminology's neglect of environmental harms (Lynch, 1990; South, 1998). This interdisciplinary field draws upon environmental sociology, political ecology, conservation biology, and critical legal studies to examine environmental crimes and justice (Brisman & South, 2019). Unlike traditional criminology, which accepts legal definitions of crime as given, green criminology adopts a broader conception of harm that includes legally permissible but ecologically destructive activities (Beirne & South, 2007). The treadmill of production theory, developed by Schnaiberg (1980) and elaborated by Lynch and Stretesky (2003), provides a political-economic

framework for understanding environmental crimes. This theory argues that capitalist economies are structurally dependent on continuous expansion of production and consumption, creating systemic pressures toward environmental degradation (Gould et al., 2008).

From this perspective, environmental crimes are not aberrations but predictable outcomes of economic systems that externalize environmental costs and prioritize profit accumulation over ecological sustainability (Lynch, 2020). White's (2008) eco-justice framework distinguishes among three forms of environmental justice: environmental justice (addressing environmental racism and disproportionate impact on marginalized communities), ecological justice (recognizing the rights of ecosystems and non-human species), and species justice (protecting individual animals from harm and exploitation). This tripartite framework highlights that environmental crimes harm multiple constituencies and that effective responses must address multiple dimensions of injustice (White, 2013). Conservation criminology, developed by Gibbs et al. (2010), focuses specifically on crimes against wildlife and natural resources. This approach examines the routine activities that facilitate environmental crimes, the rational choice calculus of offenders, and situational crime prevention strategies applicable to environmental protection (Nurse, 2015). Conservation criminology has proven particularly valuable for understanding wildlife trafficking networks and designing enforcement interventions to disrupt illegal wildlife trade (Pires & Clarke, 2012).

Green cultural criminology examines how cultural meanings, media representations, and symbolic practices shape understandings of environmental harm and influence enforcement priorities (Brisman, 2008). This perspective highlights how environmental crimes may be normalized, denied, or rendered invisible through cultural narratives that legitimize ecological destruction in the name of economic development (Kramer, 2013).

3.3 Categories of Environmental Crimes and Enforcement Challenges

Pollution crimes encompass illegal discharge of pollutants into air, water, or soil in violation of environmental regulations (Situ & Emmons, 2000). These offenses range from knowing violations of permit conditions by industrial facilities to illegal dumping of hazardous waste (Hammit & Reuter, 1988). Enforcement challenges include the technical complexity of proving violations, difficulty establishing criminal intent, and the corporate structure of offending entities which can obscure individual responsibility (Lynch et al., 2004). The mens rea requirement for pollution offenses varies across jurisdictions, with some requiring knowing violations while others impose strict liability for specified harms (Lazarus, 2004). This variation reflects

ongoing debates about the appropriate role of criminal law in environmental regulation and concerns about overcriminalization of technical violations (Stewart, 2011). Studies indicate that criminal prosecutions for pollution offenses remain relatively rare, with regulatory agencies preferring administrative penalties and negotiated compliance strategies (Gray & Shimshack, 2011).

Wildlife crimes include illegal hunting, trafficking in endangered species, illegal fishing, and habitat destruction (Sollund, 2011). These offenses constitute a multi-billion dollar illicit economy that threatens biodiversity and ecosystem functioning (UNODC, 2020). Wildlife trafficking operates through sophisticated transnational networks that exploit weak governance, corruption, and limited enforcement capacity in source countries (Wyatt, 2013). Enforcement of wildlife crimes faces distinctive challenges including vast geographic areas requiring surveillance, the involvement of organized crime networks, corruption of enforcement officials, and cultural practices that normalize wildlife exploitation (Lemieux & Clarke, 2009). The Convention on International Trade in Endangered Species provides the primary international legal framework, but implementation remains highly variable across signatory nations (Reeve, 2006). Recent years have seen increased recognition of wildlife crimes as serious organized crime requiring coordinated international law enforcement responses (Elliott, 2012).

Corporate environmental crimes involve violations committed by business entities, ranging from small firms to multinational corporations (Lynch et al., 2004). These offenses often involve systematic violations of environmental regulations to reduce costs and increase profits, sometimes with knowledge and approval of senior management (Kramer & Michalowski, 2006). Notable cases include the BP Deepwater Horizon oil spill (2010), the Volkswagen emissions scandal (2015), and numerous illegal logging operations (Jarrell, 2007). Enforcement of corporate environmental crime is complicated by the organizational structure of corporations, which can obscure individual responsibility and limit accountability (Tombs & Whyte, 2015). Prosecutors face challenges in piercing the corporate veil to identify culpable individuals and in gathering evidence from complex organizational hierarchies (Coffee, 1981). Corporate defendants often possess substantial legal resources enabling vigorous defense strategies, while penalties may be insufficient to deter violations when viewed against corporate profits (Braithwaite, 1984).

3.4 Law Enforcement Capacity and Institutional Challenges

The enforcement of environmental criminal law depends upon institutional capacity, resources, expertise, and political will (White, 2011).

Environmental law enforcement agencies face chronic resource constraints, with environmental crimes typically receiving lower priority than conventional crimes in police and prosecutorial agendas (Wellsmith, 2011). Many jurisdictions lack specialized environmental crime units, and law enforcement officers often lack training in environmental law and investigation techniques (Clifford & Edwards, 2012). The evidentiary requirements for environmental criminal prosecutions present significant challenges (Lazarus, 2004). Proving environmental violations often requires complex scientific evidence regarding pollution levels, ecological impacts, and causal connections between defendant actions and environmental harm (Mumford, 1992). Expert witnesses are necessary but costly, and defendants may challenge scientific methodologies and dispute regulatory standards (Faure & Heine, 2015). Prosecutorial discretion significantly shapes enforcement outcomes, with prosecutors often declining to pursue environmental cases due to their complexity, uncertainty of conviction, and competing demands on limited resources (Jarrell & Ozymy, 2012). The decision to criminally prosecute rather than pursue administrative penalties involves multiple considerations including egregiousness of the violation, prior offending history, and degree of environmental harm (Uhlmann, 2009). Judicial capacity and attitudes also influence enforcement effectiveness (Pring & Pring, 2009). Some jurisdictions have established specialized environmental courts with judges trained in environmental law and science, improving the quality of adjudication (Preston, 2014). However, in many jurisdictions, environmental cases are heard by generalist courts where judges may lack expertise and may not appreciate the seriousness of environmental offenses (Van Rooij, 2010). The transnational nature of many environmental crimes creates jurisdictional challenges and requires international cooperation (White & Heckenberg, 2014). INTERPOL has established an Environmental Crime Programme to facilitate international law enforcement collaboration, but coordination remains imperfect due to varying legal frameworks, enforcement priorities, and resource constraints across nations (Elliott, 2012).

3.5 The Enforcement Gap: Law in Theory versus Law in Practice

A persistent gap exists between the formal provisions of environmental criminal law and actual enforcement practice (Van Rooij, 2006). Many jurisdictions have enacted comprehensive environmental criminal statutes but fail to vigorously enforce them, creating symbolic legislation that provides the appearance of environmental protection without delivering substantive results (Hawkins, 1984). This enforcement gap reflects multiple factors. Political pressure from industry groups may constrain aggressive enforcement, particularly where environmental regulations are perceived to

conflict with economic development goals (Lynch & Stretesky, 2003). Regulatory capture, wherein industries influence the agencies tasked with regulating them, can result in weak enforcement and cozy relationships between regulators and regulated entities (Carpenter & Moss, 2014). Resource constraints fundamentally limit enforcement capacity, as environmental agencies typically receive budgets disproportionate to their regulatory mandates (Cohen, 1998). When agencies lack sufficient inspectors, investigators, and attorneys, violations often go undetected or unpunished. The shift toward cooperative compliance strategies, while potentially effective in some contexts, may reflect resource limitations as much as philosophical commitments to consensual regulation (Ayres & Braithwaite, 1992). Cultural and ideological factors also shape enforcement patterns. Environmental crimes may not be perceived as "real crimes" by enforcement officials, judges, and the public, resulting in normalization of environmental violations and lenient sanctioning (Lynch et al., 2004). The social characteristics of environmental offenders—often respectable businesspersons and corporations may evoke sympathy or deference from criminal justice actors accustomed to processing conventional street criminals (Sutherland, 1949).

4. CONCLUSION

This article has examined the development of criminal law concerning environmental crimes and analyzed law enforcement from a green criminological perspective. The findings reveal both significant progress in legal frameworks and persistent challenges in enforcement practice. Environmental criminal law has evolved substantially over the past five decades, expanding from limited pollution controls to comprehensive regimes addressing diverse environmental harms including wildlife crimes, illegal waste disposal, and corporate environmental violations (White, 2018). The application of green criminological theory illuminates how environmental crimes are embedded in political-economic structures that systematically generate ecological harm (Lynch, 2020). The treadmill of production drives corporations and nations toward environmental exploitation, creating powerful incentives for legal violations and weak enforcement (Lynch & Stretesky, 2003). Understanding environmental crimes requires attention to these structural dynamics rather than focusing solely on individual offenders or isolated incidents. Law enforcement of environmental crimes faces distinctive challenges including technical complexity, corporate defendants with substantial resources, transnational dimensions, and chronic institutional capacity limitations (White, 2011). The enforcement gap between formal legal provisions and actual practice reflects resource constraints, political

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pressures, regulatory capture, and cultural attitudes that minimize the seriousness of environmental offenses (Van Rooij, 2006).

Criminal justice systems designed for conventional street crimes often prove ill-suited for addressing sophisticated corporate environmental violations. Despite these challenges, promising developments suggest pathways toward more effective enforcement. Specialized enforcement units, enhanced penalties for egregious violations, civil society participation in enforcement, technological innovations in monitoring, and strengthened international cooperation demonstrate potential for improving outcomes (Clifford & Edwards, 2012; Interpol, 2014). However, meaningful progress requires not only technical reforms but also political commitment to prioritizing environmental protection and recognizing environmental crimes as serious threats to human and ecological well-being. From a green criminological perspective, effective responses to environmental crimes must address root causes rather than merely punishing individual violations (Brisman & South, 2019). This requires challenging the structural drivers of environmental harm, including economic systems that externalize environmental costs, political arrangements that privilege corporate interests over ecological protection, and cultural narratives that legitimize environmental destruction (Ruggiero & South, 2013). Criminal law alone cannot solve environmental problems, but vigorous enforcement can establish accountability, deter violations, and express societal commitments to environmental stewardship. Several recommendations emerge from this analysis:

5. LIMITATION

This study acknowledges several limitations that constrain the scope and generalizability of findings. First, the research necessarily relies on documented cases, reported statistics, and accessible legal materials, creating potential selection bias toward jurisdictions with transparent legal systems and comprehensive reporting (Van Rooij, 2010). Many environmental crimes occur in contexts where enforcement is minimal and documentation is sparse, rendering them invisible to academic analysis (Bisschop, 2012). Second, the comparative analysis focuses primarily on Western industrialized nations and selected emerging economies where English-language sources are available. This geographical limitation means that enforcement experiences in many nations, particularly in Africa, Asia, and Latin America, receive insufficient attention despite their critical importance for global environmental protection (Elliott, 2012). The transferability of findings to different political, economic, and cultural contexts remains uncertain. Third, enforcement data exhibits significant limitations including inconsistent definitions across jurisdictions,

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varying reporting practices, and incomplete coverage of environmental violations (Gray & Shimshack, 2011).

Statistics on prosecutions and convictions capture only a small fraction of actual environmental crimes, as many violations go undetected or are resolved through administrative mechanisms rather than criminal processes (Hawkins, 1984). The dark figure of environmental crime the unknown extent of unreported and undetected offenses likely dwarfs official statistics. Fourth, the study's reliance on doctrinal legal analysis cannot fully capture the informal practices, discretionary decisions, and power dynamics that shape enforcement outcomes (McBarnet, 2006). Law in action differs substantially from law in books, and ethnographic research on enforcement agencies would provide valuable insights not accessible through document analysis alone (Hutter, 1997). Fifth, the green criminological perspective, while providing valuable critical insights, represents one theoretical lens among several possible approaches to understanding environmental crimes (Goyes & South, 2017).

Alternative frameworks including ecological modernization theory, risk society theory, and environmental economics offer different analytical purchase on environmental regulation and enforcement (Mol & Spaargaren, 2000). Sixth, the rapidly evolving nature of environmental challenges means that any analysis risks obsolescence, as new forms of environmental harm emerge and enforcement practices adapt (White, 2018). Climate change, in particular, is generating novel environmental crimes including carbon credit fraud and adaptation maladaptation that are not fully captured in existing legal frameworks or scholarly analysis (Walters & Westerhuis, 2013). Finally, the normative dimension of green criminology its explicit commitment to environmental protection and ecological justice may influence analytical judgments about enforcement effectiveness (Lynch & Stretesky, 2014). While this study strives for analytical rigor, the researcher's environmental commitments inevitably shape problem framing and interpretation.

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