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Insect Trafficking: A Green Criminological Perspective

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Abstract

In May of 2025, four men were sentenced in a Kenyan court for the attempted smuggling of ants. This case underscores a largely overlooked dimension of global wildlife crime: the trafficking of insects. This article aims to discuss the nature of insect trafficking in legal, criminological, and conservation discourses and to argue for its inclusion in broader debates within environmental justice discourse. Exploring legal and policy dimensions of wildlife trafficking through a green criminological lens, this paper underscores the anthropocentric bias in wildlife protection, which marginalises noncharismatic species despite their ecological importance. It concludes that a shift toward ecological and species justice is necessary, advocating for more inclusive legal definitions, improved enforcement mechanisms, and interdisciplinary research. Recognising insects as victims of environmental harm is essential for developing holistic responses to wildlife crime and advancing the goals of green criminology.

Keywords: green criminology; insect trafficking; wildlife trafficking; environmental harm; species justice

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1. Introduction: What Is Insect Trafficking?

In May of 2025, four men were sentenced in a Kenyan court to one year in prison or to pay a fine equivalent to GBP 5800 for the attempted smuggling of around 5000 ants out of the country in a wildlife trafficking operation (BBC 2025). Garnering international attention, the traffickers aimed to sell these ants as exotic pets, transporting them in individual test tubes and syringes alongside small amounts of cotton wool (Muiruri 2025). This case underscores a largely overlooked dimension of global wildlife crime, the trafficking of insects.

The illegal transport of these ants, and insect trafficking overall, operates within the broader framework of transnational wildlife trafficking markets, which involves the poaching, smuggling, processing, and distribution of flora and fauna species. This includes fauna and flora that are subject to harvest quotas and regulated by permits, in addition to any components of these species (Wong 2019; Wyatt 2022). Whilst public attention around wildlife trade often focuses on charismatic megafauna and their derivatives, such as elephant ivory and rhino horn (White and Heckenberg 2014), insect trafficking constitutes a noteworthy yet less visible component of this illicit market.

Insects belong to the classification *Insecta*, which includes species such as ants, beetles, butterflies, and bees. Typically, these species have a tripartite body structure comprising of a head, thorax, and abdomen, along with six legs. Many *Insecta* also possess wings, although this trait varies depending on the individual species. As estimated by Stork et al.

(2015), there are around 5.5 million insect species globally, demonstrating the potential for significant variation within insect trafficking. For the purpose of this article's discussion regarding insect trafficking, it is important to delineate insects from other arthropods. Taxonomic species such as *Arachnida*, which includes species such as tarantulas, are arthropods; however, they do not fall under the classification of *Insecta*. This distinction is important to note due to the implications for legal frameworks, alongside conservation research and policy, and as such, falls outside the remit of insect trafficking. However, it should be noted that although these arthropods will not be strictly considered under insect trafficking, they will be discussed in relation to broader wildlife and insect trafficking convergencies with other species. Moreover, given the large array of species, insect trafficking, and invertebrate trafficking more generally, is not confined to any specific region and is a transnational market covered by numerous international and varying domestic policies (See Lassaline et al. 2025).

As noted, wildlife crime discourse and policy are often dominated by narratives that tend to focus more on charismatic megafauna (White and Heckenberg 2014). This reinforces a hierarchy of protection, with more popular species often receiving greater attention from the public, who in turn value them more, and as such warrant more protection (Nurse and Wyatt 2020). This focus points to insect species falling outside of public support and arguably marginalises them, as they are perceived as requiring less public concern, and as such, less policy attention. However, insects play a key role in numerous ecosystem functions, including pollination and serving as a food source for other species. Their decline can have cascading effects on biodiversity, which makes their protection a matter of both ecological importance and of human concern (See van der Sluijs 2020). As such, despite the increase in media attention from the high-profile ant case and a growing body of literature on wildlife crime, insect trafficking remains an underexplored area both within academic research, alongside policy and enforcement frameworks. This absence of knowledge hinders overall criminological understanding of insect trafficking, in addition to limited knowledge of the scale, methods, and consequences of this trade.

This article aims to discuss the hidden nature of insect trafficking in legal, criminological, and conservation discourses, and to argue for its inclusion in broader debates in environmental justice. Exploring this through a green criminological lens, the article aims to contribute to this area by examining current legal protections in place for insects, in addition to exploring the current dynamics of insect trafficking, outlining general trends, methods, and motives driving the market. From here, it will consider the challenges in enforcement and the dangers of failing to prevent insect trafficking from an environmental, ecological, and species justice perspective.

2. Insect Trafficking from a Green Criminological Perspective

Our analysis of insect trafficking is considered through the lens of green criminology, which applies a broad 'green' perspective to environmental harms, ecological justice, and the study of environmental laws and criminality (Lynch and Stretesky 2014). This green perspective examines crimes and harms affecting the environment and non-human animals, with a focus on the issue of harm and its (negative) impact on the environment and non-human nature, rather than on whether that harm was the subject of illegal or legal activity. What matters in green criminology is the consequences of harmful action and how justice systems and policy need to deal with those harms, irrespective of whether the conduct involved was distinctly criminal in nature and classification. Accordingly, green criminology is often focused on how to repair harm, adopting a zemiological approach that contextualises environmental harm as social harm (Tombs 2018). Green criminological scholarship has, thus, paid direct attention to theoretical questions of whether and how

justice systems deal with crimes against animals and the environment more generally; it has begun to conceptualise policy perspectives that can provide contemporary ecological justice alongside mainstream criminal justice. Moving beyond mainstream criminology's focus on individual offenders and its mainly anthropocentric conceptions of victimology, green criminology also explores state failure in environmental protection, corporate environmental offending, and environmentally harmful business practices within the operation of neoliberal markets (Nurse 2017).

Green criminological perspectives are critical of criminology's relative silence on the harms caused to ecosystems and the non-human natural environment and contend that 'members of other animal species and the rest of non-human nature urgently need to be protected from destructive human activities' (Benton 1998, p. 149). Green criminology, as an umbrella term for a criminology concerned with the general neglect of ecological issues within criminology, is also critical of criminology's general failure to deal with environmental issues. As Lynch and Stretesky put it,

> 'As criminologists we are not simply concerned that our discipline continues to neglect green issues, we are disturbed by the fact that, as a discipline, criminology is unable to perceive the wisdom of taking green harms more seriously, and the need to reorient itself in ways that make it part of the solution to the large global environmental problems we now face as the species that produces those problems'. (Lynch and Stretesky 2014, p. 2)

Thus, a green criminological perspective contends that justice systems need to adapt to the needs of nature and non-human animals, which means the justice systems' consideration of non-human nature as a crime victim. It also means that when considering wildlife crimes such as insect trafficking, we should consider the harm directly caused to the insects as wildlife removed from their natural habitat, the wider harm caused to ecosystems because of that removal, and the criminality involved in the wildlife trafficking operation. This involves considering the roles of a range of actors in trafficking operations, as well as whether environmental policy approaches should also consider end consumers and demand reduction approaches (Schneider 2008).

Two key criminological conceptions are relevant to this article's discussion of insect trafficking: ecological justice and species justice. Within the perspectives of ecological justice and species justice in green criminology, there is a contention that justice systems need to go beyond just considering anthropocentric notions of criminal justice; they should also consider, for example, the position of the environment and non-human animals as victims of crime and how justice systems can provide protection and redress for the environment and other non-human species. This involves direct consideration of repairing environmental harm and not just the retributive punishment approaches of mainstream criminology. Ecological justice acknowledges that human beings are only one part of the planet and that any system of justice needs to consider the wider biosphere and species that depend on nature. Within an ecological justice perspective, there is scope to incorporate what is referred to as a consequentialist ethic, a theoretical conception concerned with goodness or badness as being more important than 'rightness' or 'wrongness' (Brennan and Lo 2008). Species justice considers the responsibility humans owe to other species as part of broader ecological concerns. Thus, within this conception, humankind, as the dominant species on the planet, has considerable potential to destroy nonhuman animals, or, through effective laws and criminal justice regimes, to ensure effective animal protection, and so has a responsibility to act accordingly. This includes animal rights, aspects of animal protection, and criminality involving a range of nonhuman animals. Thus, contemporary criminal justice needs to extend beyond traditional human ideals of justice as a punitive or rehabilitative ideal, to incorporate shared concepts of reparative and restorative justice

between humans and non-human animals. In effect, the justice system needs to be modified to provide for a broad criminal justice perspective, i.e., justice for all sentient beings, not just for humans. The type of justice should also consider appropriate forms of redress, reparation, and restoration.

How the justice system should deal with these issues is a core concern of green criminology. Rob White identifies the following three approaches:

1. **The Socio-legal Approach**—which emphasises the use of the current criminal law and attempts to improve the quality of investigation, law enforcement, prosecution, and conviction of environmentally related illegal activity.
2. **The Regulatory Approach**—which emphasises social regulation, using many different means as the key mechanism to prevent and curtail environmental harm. This attempts to reform existing systems of production and consumption using enforced self-regulation and bringing NGOs into the regulatory process.
3. **Social Action Approach**—which emphasises the need for social change, predominantly through democratic institutions and citizen participation.

(adapted from White 2008)

As Lynch and Stretesky state, 'the form of criminal justice criminologists ordinarily examine to discuss the control of crime is a narrow form of justice' (Lynch and Stretesky 2014, p. 7). Conceiving an effective form of justice with respect to insect trafficking entails considering more than just individual victims of crime (Benton 1998), with a focus on, for example, ant colonies as a living ecosystem, and requires exploration of a wider range of criminal behaviour than just that of the rationally driven offender to negate anthropocentric views of insect trafficking as a victimless crime (Nurse 2013).

The lack of both scholarly and law enforcement attention to trafficking in insects, despite this activity being part of the discourse on wildlife crime as one of the most serious global crime problems, identifies failures in both policy and law enforcement approaches. Wildlife trafficking, and in this case, the illegal trade in insects, exists within the wider conception of illegal activities affecting non-human animals and non-human nature living in the wild. The threats to wildlife incorporate a range of human activities, both legal and illegal. The International Union for the Conservation of Nature (IUCN) identified that thousands of pressures impact wildlife (IUCN 2015). Some of these pressures are more general, such as habitat destruction, commercial development that displaces wildlife or encroaches on its territory, and climate change. Other threats are more direct, including hunting, illegal predator control, and wildlife trafficking, the subject of this article. In some cases, wildlife trafficking has the potential to drive species to extinction; thus, legal controls (discussed in the next section) have been implemented to try and address threats caused by trade and other human-centred threats that can threaten rarer species with extinction.

Applying a green criminological perspective to insect trafficking, we contend that the continuing focus of policy and mainstream criminological thought on charismatic megafauna such as rhinos, lions, etc., is inherently flawed. It adopts an anthropocentric approach to wildlife protection and views the value of wildlife through a narrow lens that fails to consider wildlife in terms of its intrinsic value (Batavia and Nelson 2017). Thus, species such as insects, deemed to have little economic and social value, are often ignored, whereas, in reality, they are a vital part of ecosystems, and their removal can have far-reaching impacts. In addition, the illegal activity involved in trafficking remains problematic and is contrary to the law, irrespective of whether it is the trafficking of small or large species, and whether or not the species are perceived to have value to human interests. Thus, a green criminological perspective contends that justice systems need to adapt to consider the needs of nature and non-human animals, which means justice

systems' consideration of non-human nature as crime victims. It also means that when considering wildlife crimes such as insect trafficking, we should consider the harm directly caused to the insects as wildlife removed from their natural habitat, the wider harm caused to ecosystems as a consequence of that removal, and the criminality involved in the wildlife trafficking operation.

3. Legal Protections for Insects

Most jurisdictions have legislation protecting native wildlife, which is generally defined as 'the native fauna and flora of a state and is arguably commonly understood to mean animals that live in a wild state outside human control' (Nurse and Wyatt 2020, p. 3). Nurse and Wyatt (2020) proposed a holistic definition of 'wildlife crime' that 'includes a broad range of harmful acts that encompasses direct and indirect acts or omissions and that indicate failure to comply with legal obligations or comply with legislation, irrespective of whether the legislation or its associated sanction is distinctly criminal in nature' (Nurse and Wyatt 2020, pp. 7–8). Some legal definitions of wildlife exclude fish, plants, and non-native fauna and flora, for example, introduced species (often described as 'invasive' species) and those that have escaped into the wild (even where escaped populations have become established in the wild), and will not always include insects. However, US animal law Professor Joan Schaffner identified US federal conservation law that defined wildlife as 'any wild animal. . .including without limitation any wild mammals, bird, reptile, amphibian, fish, mollusk, crustacean, anthropod, coelenterate, or other invertebrate, whether or not bred, hatched, or born into captivity' (Schaffner 2011, p. 59). Thus, Schaffner's definition of wildlife covers a wide range of vertebrate and invertebrate species that would apply to insects. This is consistent with international wildlife and biodiversity law, which has consistently aimed to protect the natural environment and non-human nature from over-exploitation.

Key principles of the 1972 Stockholm Declaration on the Environment are aimed at safeguarding 'the natural resources of the earth including the air, water, land, flora and fauna and especially representative samples of natural ecosystems' (Principle 2). The Declaration also identifies that 'Man has a special responsibility to safeguard and wisely manage the heritage of wildlife and its habitat, which are now gravely imperiled by a combination of adverse factors' (Principle 4). Subsequently, international law on the protection of biodiversity was passed, requiring nation-states to conserve and protect their biodiversity and to introduce relevant management plans and monitoring systems to prevent over-exploitation of natural resources (Tollefson and Gilbert 2012). Article 1 of the Convention on Biodiversity (CBD) states the objectives of the CBD as being 'the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources', thus allowing for continued exploitation of wildlife as a natural resource, albeit within the confines of a sustainable perspective that aims to provide for maintaining sustainable wildlife populations and allowing exploitation of wildlife provided that species are not driven to extinction. The implementation of the CBD and the precise nature of domestic wildlife protection is primarily left to national law to determine, although international law is also active in respect of wildlife trafficking and trade in threatened species in the form of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES).

Legal provisions are in place to regulate the trade in wildlife, while the levels of criminalisation for wildlife trafficking vary depending on the country and how it has framed international perspectives within its domestic law. CITES requires state parties to implement a sanctions regime, although research indicates some variation in how states have implemented these requirements and suggests that CITES has not been entirely

effective (Wyatt 2021). CITES regulates the international trade in wildlife through a process of classification, through which it protects over 38,700 endangered species from over-exploitation, comprising of about 5950 species of animals and 32,800 species of plants. CITES' classification system is contained in a series of Appendices, which specify different levels of protection for wildlife, in part determined by its conservation status and the extent to which wildlife is considered threatened by trade. Appendix I largely prohibits trade for species considered to be highly endangered (with limited exceptions), and Appendix II lists species considered less threatened by trade but for which trade must be controlled, specifying limitations on which species may be traded. Appendix III relates to species not currently threatened by trade, but where there is some form of concern about the species population.

CITES is arguably consistent with international law's starting point of preventing unsustainable exploitation of wildlife as a natural resource, whilst allowing sustainable use. Thus, it is not entirely preventative and seeks to regulate trade rather than outright ban it. Political considerations are arguably at play here with resource rich source countries (such as African and South American States) wishing to determine how best to protect and utilise their biodiversity as a resource, subject to complying with their obligations under the international agreements that they are party to. Accordingly, the starting point for international law on wildlife protection is not one of outright prohibition, preventing any exploitation or use of wildlife as an exploitable natural resource. Instead, wildlife law seeks to achieve several, sometimes conflicting objectives. This includes protection, conservation, management, and exploitation (Nurse and Hejny 2025).

Protections for insects vary. The conservation status of each ant species affects their level of protection both nationally and internationally, with respect to how legal protections implement the concept of greater levels of protection according to perceived threat status. For example, ant species that are on the IUCN red list, the largest classification of endangered species produced by the IUCN, and that are classed as critically endangered or endangered, cannot be captured, killed, or disturbed in any manner. Inclusion in the red list does not by itself provide automatic increased legal protection or create specific offences in respect of threatened species. However, the data and assessments provided by the red list are part of the process of determining the required level of protection commensurate with the assessed threat to a species. Accordingly, within both CITES and domestic legislation, the notion of 'special protection' for vulnerable species is implemented based on available scientific data. Thus, controls under CITES or domestic law come into play where trade in threatened or endangered ant species might be involved.

Much of the enforcement attention in wildlife trade is focused on the charismatic CITES species, whereas the nature of legal controls of insect trade is arguably less well developed. The World Organisation for Animal Health and Collectif TIS (Technique de l'Insecte Stérile), a French think tank, conducted a stakeholder survey into the nature of the live insect trade and identified poor knowledge of the various regulations and a perceived lack of clarity regarding live insect shipments within international regulations and guidelines (Oliva et al. 2022). Lack of clarity on the legal requirements for transporting and selling insects has been identified in some research (Carvalho 2022). The existence of a legal trade in edible insects that allows the transport and sale of some species also places an additional burden on law enforcement to be able to clearly identify the nature of legal controls, which vary from country to country (Lähteenmäki-Uutela et al. 2017).

4. Global Dynamics of Insect Trafficking

With the global trade in insects operating in a legal grey area intersecting both legitimate and illicit markets, the dynamic of insect trafficking encompasses a wide spectrum of

species, trends, and motivations. Whilst many insects are traded for legitimate purposes, such as scientific research, pets, and human consumption, these patterns are often echoed within illicit markets. Ascertaining the value of legal and illicit insect markets presents challenges due to inconsistent reporting of CITES trade data, fluctuating market trends, and the prevalence of grey markets (See Sollund 2019; Nurse and Wyatt 2020; Wyatt 2021). Despite this, there are some estimates that provide insight into the scale of the insect markets. For example, although it is challenging to determine the exact stats, the consumption market for insects is forecast to be worth around USD 17.9 billion by 2033 (See Omuse et al. 2024; Abro et al. 2025), highlighting the growing demand from these markets and space for illicit markets to thrive.

One key challenge in understanding the global dynamic in insect trafficking is an issue with a lack of reliable data and a broader dark figure of crime, obscuring trafficking knowledge (Wellsmith 2011). This is further hindered by the influence of the insect trade policy complexities, where insects are traded under the guise of legality, or by working around international and domestic legislation. As with wildlife trafficking more generally, many cases involve species-specific protections being absent under CITES legislation, indicating that the trade relies on domestic policy. CITES regulates international trade and not domestic trade; thus, species unregulated by CITES are not included in its trade assessments. Currently, the CITES lists incorporate 20 species or sub-species of insects, which suggests that more than 99% of insect species fall outside of CITES regulatory controls and thus fall outside of CITES market assessments. The unregulated nature of some species creates opportunities where, for example, the collection and export of a species may be illegal in the country of origin, yet its sale remains lawful in the destination country (See Nurse and Wyatt 2020; Wyatt 2021). For example, there have been numerous cases of attempts to traffic satanas beetles out of countries such as Bolivia to then sell them legitimately for the pet trade out of Japan (CITES 2010; Berton 2020), demonstrating the complications in understanding the nature of both legitimate insect trading and insect trafficking.

As with other wildlife trafficking markets, there is significant variation in the nature of individual markets, which vary in relation to scale, motivations and trends, and policies (UNODC 2024). This is observed within insect trafficking, as with legitimate insect markets, which span numerous taxonomic groups, including ants, bees, butterflies, and beetles (See CITES 2010; Carvalho 2022; RUSI 2025). Furthermore, echoing wildlife trafficking, profits vary by trade, country, and demand (Nurse and Wyatt 2020; Wyatt 2022). Numerous instances point to the value of insect species varying in relation to market profits and/or of large scale (Berton 2020; RUSI 2025; USFWS 2025). One example, which points to the value of these markets, is from April 2025, in Brooklyn, New York, where an offender was sentenced in relation to the seizure of numerous insect species, including 17,000 butterflies, with an estimated value of this collection being more than USD 200,000 (USFWS 2025).

The dynamics of these markets are often broken down into the poaching, smuggling, processing, and distribution of species (Wong 2019). Regarding the origins of insect trafficking, where poaching may take place. This will vary in regard to species; however, typically what is observed globally is insect species often being taken from biodiversity hotspots in the global south and taken to global north countries (See CITES 2010; Gippet and Bertelsmeier 2021). From a southern green criminology lens, this is reflected in other environmental issues where resource theft from Global South countries is taking place in many cases tosupply the Global North (Goyes 2019). As such, this lens recognises that the problems of environmental exploitation may be felt more by those in the Global South source countries and that Global North solutions and enforcement approaches may not be suitable in all contexts (Goyes 2019). Furthermore, insect trafficking often echoes other wildlife markets in the methods which are used in smuggling species. Often, deceptive

methods are used, such as the mislabelling of species as legitimate species, or deceptive packaging is used with traffickers concealing wildlife products to avoid detection (Wyatt 2022). Traffickers have been found to conceal insects using an array of everyday items such as children's toys, sweet containers, and by hiding them under clothing, all in an effort to avoid detection (See U.S. Customs and Border Protection 2020; RUSI 2025). For example, one case involved 37 live beetles being trafficked into Los Angeles International Airport, hidden within Japanese snack packaging, including chocolate and crisp packets (U.S. Customs and Border Protection 2025), demonstrating the novel smuggling methods traffickers will attempt to use. The RUSI organisation (2025) discussed some key modus operandi in relation to insect trafficking. These include the use of specimen tubes with cotton wool containing nutrient solutions and small holes, placed on the person or within luggage; use of postal services; package mislabelling; as well as broader concealment techniques such as hiding test tubes within stuffed toys (RUSI 2025). These smuggling techniques underline the adaptive methods being utilised by traffickers, exploiting possible enforcement limitations, thereby creating further ambiguity about how these markets operate.

Additionally, there are areas of market convergencies with broader invertebrate markets, such as with other arthropod species, as illustrated by a seizure case involving a man who was caught attempting to smuggle bullet ants alongside spider and centipede species from Lima, Peru, to South Korea (Hassan 2024). Techniques like this are not unique to insect trafficking, with similar strategies being observed for reptiles and bird species often overlapping to maximise profits (Sollund 2019). Other observations of market convergencies point to wildlife crime often taking place alongside other illicit markets such as drugs (van Uhm et al. 2021), which suggests the possibility of other illicit markets overlapping with insect trafficking. However, although these methods are highlighted, it should be noted that, as with the previously mentioned challenges with wildlife crime enforcement (Wellsmith 2011), insect trafficking, in part due to these smuggling methods, suffers from a dark figure of crime. This will be further exacerbated by law enforcement agencies often not prioritising wildlife crime in comparison to markets such as drugs and firearms (Wellsmith 2011; Nurse and Wyatt 2020). As such, although seizures and research will reflect area trends within the market, the full dynamic of insect trafficking, including method, trends in species, and overarching scale, is unknown.

Equally, as with overarching wildlife trafficking markets (Lavorgna 2014; UNODC 2024), a growing aspect of insect trafficking dynamics is the facilitation of the trade via the use of online platforms. As discussed in regard to crime and harm by Munk and Kennedy (2025), there is a technological shift and continued online–offline continuum, indicating that online behaviours are causing real-world harm. Evidence has pointed out that social media platforms and trading websites have all become online spaces where insects are being sold (Carvalho 2022; Losey et al. 2022; USFWS 2025). As discussed by Lavorgna (2014), this use of the online space boosts wildlife trafficking markets by creating new opportunities for traffickers to launder wildlife products, alongside providing further access to newer clientele.

Domestic biosecurity legislation also applies in respect of providing prohibitions on import and export and in addressing possession and sale within the national jurisdiction (e.g., prohibitions on theft or illegal exploitation of national biodiversity). Such laws can be part of domestic implementation of CITES or domestic implementation of the Convention on Biodiversity (The Rio Convention), or domestic natural resource protection. The level of protection varies from country to country, potentially resulting in trafficked species being "legitimised", although definitions of protected wildlife can be applied at the species level, such that, for example, if a species is resident within a territory and recognised as protected wildlife, the available protections might apply even if the species has been

trafficked. Thus, in some cases, domestic wildlife laws go beyond the basics of CITES and can ensure stronger protection. For example, the creation of offences relating to possession of wildlife by designating wildlife products, parts, and derivatives as 'Government trophies' in some African legislation creates strict liability possession offences even where trade offences may be difficult to prove.

This demand for insects has been influenced by a range of drivers which are interlinked with both cultural practices alongside economic incentives. As with other conservation efforts, understanding human dimensions of wildlife can help improve conservation efforts alongside crime and harm prevention (Bennett et al. 2016; Nurse and Wyatt 2020). The motivations regarding insect trafficking include areas such as the traditional medicines trade, such as the use of insects to treat digestive and skin disorders, the exotic pet trade, collectibles, and consumption (Trietsch and Deans 2018; Kitade and Naruse 2020; Siddiqui et al. 2023). This array of motivations evidently contributes to the demand, persistence, and often underregulated market.

Case Study: Rhino Beetles in Japan

One example of cultural demands influencing both legal and illicit insect markets is rhino beetles in Japan, including species such as hercules and satana beetles. In Japan, these beetles have popularity amongst young people and collectors and have been a mainstay within Japanese culture (Hoshina and Takada 2012; Hoshina 2022). This has been observed in popular culture with the Pokémon heracross, in addition to featuring in significant amounts of children's toys (Hoshina and Takada 2012; Bulbapedia 2025). The species' popularity is reflected historically within the Japanese pet market, which supports this demand for beetles, with stats from 2003 indicating 318,798 rhino beetles and 364,129 stag beetles being imported into the country (Kameoka and Kiyono 2003). More recently, although exact statistics are not available, Berton (2020) discussed how ongoing demand is facilitating insect trafficking, with many cases of rhino beetles being trafficked out of Peru. This is consistent with the aforementioned incidents of beetle smuggling attempts taking place in 2007 to traffic these species (See CITES 2010). Additionally, public and consumer fascination is illustrated by the prevalence of insect fighting content online, where numerous videos on platforms such as YouTube showcase rhino beetles and other species fighting each other (see Berton 2020). It should be noted that this article does not suggest all insect fighting content is linked to trafficking; however, there is a possibility of trafficking feeding into this content. Despite this, YouTube does have "violent or graphic content" policies, which contain a section on animal abuse content, including the following:

> Animal abuse content:
>
> - Content in which humans coerce animals to fight.
> - Content in which a human maliciously mistreats an animal and causes it to experience distress outside of traditional or standard practices. Examples of traditional or standard practices include hunting or food preparation.
> - Content in which a human unnecessarily keeps an animal in poor conditions outside of traditional or standard practices. Examples of traditional or standard practices include hunting or food preparation.
> - Content that glorifies or promotes serious neglect, mistreatment, or harm towards animals.
> - Content that shows an animal rescue that is staged and puts the animal in harmful scenarios.
> - Graphic content that features animals and intends to shock or disgust.
>
> (YouTube Help 2025)

There are numerous clips available on the website that demonstrate beetles being put into fights with each other in addition to other species, suggesting that insects fall outside of this policy. This further reinforces the tendency for incidents of charismatic megafauna and species that humans have a preference for having more protection than those that are less popular (White and Heckenberg 2014). Green Criminological research has highlighted similar bias, with studies often focusing on wild animals over domesticated species (Taylor and Fitzgerald 2018). These disparities reflect speciesist narratives where economic value, conservation status, and perceived charisma of a species can inform its level of protection, reinforcing a hierarchy of value among non-human animals (White and Heckenberg 2014; Hutchinson et al. 2022).

In just one case study, the demand for rhino beetles out of Japan points to the influence of both culture and socio-economic factors on illicit insect trading and trafficking. Wildlife markets are dynamic and arguably operate consistently, guided by Adam Smith's conception of the 'invisible hand' and the self-regulation with which products and services are traded within the confines of the market ecosystem (Smith 2008). Thus, seemingly niche species such as insects will be traded where there is demand and where opportunities to trade more charismatic megafauna become either less prevalent or more rigorously enforced. It should be noted that there is variation, with different insects being more or less in demand depending on state, cultural popularity, as well as overarching availability. Evidently, the dynamics of insect trafficking closely overlap with those of broader wildlife crime markets, which have consistently presented unique challenges for enforcement agencies (see Wong 2019; Sollund 2019; Nurse and Wyatt 2020; Wyatt 2022); as such, these challenges will be equally relevant within illicit insect markets.

5. Enforcement Sanctions and Prosecutions

Enforcement of insect trafficking is situated within a response to wildlife crime that primarily adopts a criminal law approach. Wildlife legislation is broadly negative in its wording, specifying prohibited acts in relation to wildlife, for example, a prohibition on taking animals from the wild and incorporating punitive sanctions and retributive punishment notions of fines and prison as the typical responses from the criminal justice system (Horder 2016; Nurse 2015). Levels of criminalisation for wildlife trafficking are country-specific, given that the notion of state sovereignty provides considerable discretion over how a state incorporates international perspectives within its domestic law. For example, EU Member States are required to criminalise illegal wildlife trade in accordance with the EU Environmental Crime Directive, and European states broadly classify wildlife trafficking as a criminal law problem, consistent also with the principles of EU CITES legislation.[1] Other jurisdictions adopt a restorative approach to wildlife crime, with sentencing intent on repairing harm caused to wildlife.

Case Study—Kenyan Insect Trafficking

The recent case of insect trafficking referred to earlier in this article highlights some of the challenges of enforcement action. In two cases heard by the same court, Belgian nationals Lornoy David and Seppe Lodewijckx, and Vietnamese national Duh Hung Nguyen and Kenyan Dennis Ng'ang'a, were arrested in April 2025 after they were found in possession of over 5000 ants that were packed in more than 2000 test tubes filled with

[1] EU Wildlife Trade regulations include Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating trade therein (the Basic Regulation), complemented by its implementing regulations (Regulation (EC) No 865/2006, Implementing Regulation (EU) No 792/2012 and their subsequent amendments, and Commission Implementing Regulation (EU) 2019/1587 of 24 September 2019 prohibiting the introduction into the Union of specimens of certain species of wild fauna and flora in accordance with Council Regulation (EC) No 338/97 on the protection of species of wild fauna and flora by regulating trade therein).

cotton wool to help them survive for months. The two Belgians had approximately 5000 ants, while the Vietnamese and Kenyan defendants had over 400 ants. The ants included African harvester ants, which media reports suggested are valued by some UK dealers at up to GBP 170 (USD 220) each. The two cases involved trafficking ants to markets in Europe and Asia.

Kenya's Wildlife Conservation and Management Act (2013) defines wildlife as 'any wild and indigenous animal, plant or microorganism or parts thereof within its constituent habitat or ecosystem on land or in water, as well as species that have been introduced into or established in Kenya' (Section 3 of the Act). Thus, the Act protects all native Kenyan fauna, including insects. Section 99 of Kenya's Wildlife Act states that 'no person shall trade in, import, export, re-export or introduce any specimen or product of a wildlife species into or from Kenya without a permit issued by the Service under this Act'. The Act's provisions also prohibit the import or export of Kenyan wildlife and make it an offence to 'possess, sell, deliver, carry, transport, or ship, by any means whatsoever, any such species.' There are specific sanctions with respect to CITES species. Section 99(3)(a) states that offenders are subject to the following penalties:

> . . . in relation to a critically endangered or endangered species, as specified in the Sixth Schedule or listed under CITES Appendix I, to a fine of not less than one hundred million shillings or to imprisonment of not less than twenty years or both such fine and imprisonment.

In the case of non-CITES species, the potential penalties are a fine of not less than KES twenty million or a term of imprisonment of not less than ten years, or both such a fine and imprisonment (Section 99(3)(b) of the Act). The defendants in this insect smuggling case pleaded guilty to 'illegal possession and trafficking of live wildlife species' contrary to the Wildlife Conservation and Management Act (2013). The Associated Press reported that the Kenya Wildlife Service had said the case represented 'a shift in trafficking trends—from iconic large mammals to lesser-known yet ecologically critical species', identifying that prior Kenyan wildlife trafficking activity had been focused on trafficking the body parts of larger wild animals such as elephants, rhinos, and pangolins (Musambi 2025).

The Belgians were given a choice of paying a fine of USD 7700 or serving 12 months in prison, which is the minimum penalty for the offence under Kenyan wildlife conservation laws. The other two defendants were also fined USD 7700 each, with an option of serving 12 months in prison.

This case study highlights some of the challenges of prosecuting wildlife crimes. Research consistently shows that sentencing in wildlife crimes tends to be at the lower end of the scale, notwithstanding variations in respect of species and the approach taken in different jurisdictions (Wellsmith 2011; Nurse and Harding 2024). While the options for much longer prison sentences were available in this case, the level of fines was at the minimum end of the scale, potentially reflecting the perception that such crimes are seen as relatively low-level offending. Legislative review research identified that despite the push for wildlife trafficking to be seen as a serious crime, the predominant response is fines (Hutchinson et al. 2023, p. 26). Akella and Allen (2012, p. 11) also identified that 'low detection rates are endemic in wildlife crime cases' and there is also a general failure to use asset recovery mechanisms and the full sentencing and enforcement options. Prior research and policy analysis has also identified several procedural and practical difficulties in wildlife crime prosecutions, including a lack of enforcement options and investigatory resources, difficulties in bringing cases to court due to lack of prosecutorial expertise, and potential loopholes in legislation that create challenges in bringing cases to court (The President's Advisory Council on Wildlife Trafficking 2014; UNODC 2021; Nurse and Hejny 2025).

Thus, while in principle, legislative and enforcement mechanisms exist to deal with wildlife trafficking, in practice, enforcement and prosecutorial approaches to wildlife crime risk being inadequate to deal with a problem like insect trafficking.

6. The Consequences of Enforcement Challenges

As with broader green criminological issues, the failure to effectively prevent insect trafficking presents a wide range of consequences. Although harm will vary depending on species and location, this market presents risks to species decline, the spread of invasive species, and non-human animal welfare issues. These ecological and species threats are situated alongside potential challenges to human interests as a consequence of this illicit trade, including potential economic loss. In contrast to other forms of wildlife trafficking, the limited awareness around insect trafficking is itself likely to further exacerbate harm.

To begin with, insect populations within the Anthropocene are in decline. Although calculating the exact decline of individual species offers significant challenges for conservationists, studies have pointed out that insect populations are declining at a rate of about 1% to 2% per year (Status of Insects 2025). These population declines vary, with some species being more severely impacted than others, such as significant declines in beetles in New Hampshire (a mean decline of up to 83% over a 45-year period) and a 1.6% annual decline in reduction in individual butterfly species across the western United States (Harris et al. 2019; Forister et al. 2021). However, it should be noted that the exact rate of decline is unknown for insect species (Wagner et al. 2021). There is a wide array of contributing factors related to insect decline, including intensive agriculture, pollution, invasive species, habitat loss, and climate change (see Raven and Wagner 2020; Harvey et al. 2022; WWF 2024). While there is currently no precise data linking the decline of specific insect species directly to insect trafficking, wildlife trafficking has consistently been associated with broader patterns of species decline (Sollund 2019; Wyatt 2022), and as such, it is highly likely that species decline to some extent is also being contributed to by insect trafficking. Although ascertaining insect sentience poses scientific challenges (Overgaard 2021), arguably, species have interests in life, and to exhibit natural behaviour. In failing to prevent this illicit trade, these interests are not being adhered to, which, from a species justice perspective, arguably means that these animals are not being adequately protected.

As highlighted by van der Sluijs (2020), the decline in insects has implications for ecosystems within the biosphere. This includes harms to water purification within aquatic systems and nutrient cycling. Furthermore, the reduction in insect pollinators impacts food webs, which in turn can impact how ecosystems operate, with resultant impacts on human health and survivability. As such, with insect trafficking playing a role in the reduction of some insect species, this has the potential to impact human beings. This argument is supported by the impacts of wildlife trafficking more broadly, with Mozer and Prost (2023) identifying its role as a driver of biodiversity loss, supporting the risks to insect species. As such, by considering this illicit market via a green criminological lens, evidently, there are more indirect environmental harms not initially associated with insect trafficking, which points to clear failings from ecological and species justice perspectives.

As Hall (2015) highlights, green criminology extends its focus beyond contemporary environmental harms to encompass future ecological risks as a result of the Anthropocene. In the context of insect trafficking, one such implication is the translocation of species into non-native ecosystems, which, as a result of accidental or intentional introduction to the environment, have the potential to become invasive. These species can pose a risk of significant environmental harm, with the WWF (2024) Living Planet Report pointing to invasive species being a significant driver of environmental and species decline. These invasive species often lack natural predators and, in some cases, can be heavily suited

to their new environment, allowing them to establish breeding populations, which then outcompete local fauna for resources or act as predators (Simberloff 2015). One notable instance of the impacts of invasive insect species concerns the invasive hornet species *Vespa velutina nigrithorax*. A study by Pedersen et al. (2025) highlighted how these hornets are flexible predator species across multiple locations within France, Spain, the UK, and Jersey, targeting a considerable number of native insects, including pollinators and decomposer species. As such, evidently, invasive insect species threaten local biodiversity, but they can also potentially disrupt ecological balance, with long-term implications in relation to conservation and environmental efforts. This is further exacerbated by the inherent difficulty in predicting whether an insect species will become invasive, with an array of ecological, climate, and species-specific factors all impacting this. As such, whilst some progress in predicting some species, such as ants, has been made, there is currently no universal method for reliably calculating which insects will become invasive in which setting (See Simberloff 2015; Fournier et al. 2019). This provides just some aspect of the potential knock-on risk of insect trafficking, with the market potentially serving as a method for the introduction of invasive insect species.

Alongside the species-specific and environmental harm, this risk can be linked to broader economic harm due to the costs of managing these species. Although, to our knowledge, not linked to insect trafficking, coconut rhino beetles are invasive in Hawaii and have been consistently connected to significant environmental harm in a number of countries (Bedford 2013). As such, in 2024, Hawaii's Department of Agriculture announced that it would be spending USD 2.4 million on invasive species control measures specifically related to coconut rhino beetles, as part of a larger fund of USD 10 million for invasive species control measures (Hawaii Department of Agriculture 2024). Further examples include the red imported fire ant, which, as suggested in a report by The Australia Institute, could cost Australia AUD 22 billion by the 2040s if the species is not controlled (Ngoc Le and Campbell 2024). Evidently, in failing to prevent insect trafficking, there are further risks to human interests regarding both infrastructural and economic harm.

Overarchingly, the enforcement challenges surrounding insect trafficking, when examined through an environmental, ecological, or species justice perspective from White's (2008) green criminological framework, point to significant and multifaceted risks. These failures not only incur risks to the welfare and interests of insect species but evidently pose threats to human interests and the long-term integrity of the biosphere, reinforcing the necessity for further research into this underexplored area of green criminology.

7. Conclusions

This paper has considered the underrepresented issue of insect trafficking within the broader context of transnational wildlife crime and environmental harm. In considering this from a green criminological lens, insect trafficking evidently points to an area within wildlife trafficking that offers unique challenges from legal, conservation, and criminological perspectives. Despite the clear risks to human interests, alongside the ecological and species risks, insects remain outside of the public interest and, as such, outside of policy protections, in part due to being overshadowed by other charismatic megafauna. Legal frameworks and conservation efforts have historically prioritised these species, which is arguably reflected in criminological research, where insects generally fall outside of environmental harm and species victimisation discourse. However, by exploring issues of environmental harm, green criminology offers the space to identify these issues, alongside tools to analyse the potential challenges and broader harms of a range of trafficking markets.

As such, the absence of enforcement and protections as a whole not only presents risks to species interests but also means that garnering a full understanding of the methods,

trends, and true scale of insect trafficking poses significant logistical challenges. The case study of the attempted trafficking of ants out of Kenya, alongside other case studies discussed, exemplifies the complex and sophisticated nature utilised to conceal and transport insects, the transnational nature of these markets, and the clear demand for these species. Despite this, insects frequently fall outside of priorities within international frameworks such as CITES, and domestic frameworks often contain loopholes or grey areas, which indicates that insects are not protected adequately. These regulatory challenges, alongside the enforcement barriers, will likely help facilitate insect trafficking, thereby enabling continued species exploitation.

Given the concealed and under-researched nature of insect trafficking from both an academic and enforcement perspective, this paper argues for a more thorough and interdisciplinary exploration into the nature, enforcement, and varied perceptions of this illicit trade. By exploring this through a green criminological lens, further research would help to garner broader understandings of the markets by situating this issue within the wider discourse of environmental harm and species justice. This approach would help to highlight current barriers in enforcement specific to insect trafficking, in addition to offering solutions to wider issues and harms that fall outside of current legal frameworks. Therefore, in order to further explore the protections of insect species, alongside further development of green criminological and wildlife crime knowledge, an understanding of these uncharismatic species such as insects, often overlooked in criminological discourse, is required. Overall, recognising the significance of insect trafficking within criminological discussions is imperative in a time of species loss and is necessary for more holistic research and policy approaches surrounding wildlife crime.

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