

AI and Wildlife Trafficking: A Green Criminological Study of North East India

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ABSTRACT:

Over the past three decades, green criminology has absorbed concepts from ecological justice, species justice and the treadmill of production thesis to widen its account of who or what counts as a victim of environmental crime. This paper extends that narrative to the role artificial intelligence (AI) now plays in the detection of, and response to, wildlife trafficking. North East India is used as the case study region, since it combines exceptional biodiversity with porous, mountainous borders and trafficking routes that run into Myanmar, China, Bangladesh and beyond. Using a qualitative design that combines doctrinal analysis of the Wildlife (Protection) Act 1972, CITES, Articles 48A and 51A(g) of the Constitution and the Bharatiya Sakshya Adhiniyam 2023 with a review of seizure data and published empirical studies, the paper examines environmental DNA (eDNA) forensics, predictive risk-mapping, image-recognition platforms such as Wildbook, and AI-assisted cargo screening. The findings show that these tools report roughly 86 to 96 per cent accuracy in narrow, well-defined tasks, but remain untested in the road- and river-based, live-animal trade that characterises the region, while Indian law has yet to settle the evidentiary status of AI-generated outputs. The paper concludes that AI can strengthen enforcement only if it is locally validated, preceded by evidentiary reform and co-designed with the tribal and forest-dependent communities it monitors.

Keywords: Green criminology, artificial intelligence, wildlife trafficking, North East India, species justice.

1. Introduction

The illegal wildlife trade is now regularly cited (along with drugs and arms trafficking) as being one of the world's most profitable transnational crime enterprises, with North East India stuck in the middle. The region consists of eight States, two of which hold two of India's biodiversity hot spots, and share approximately 5,000 kilometres of international borders with Myanmar, China, Bhutan, Bangladesh and Nepal; and are traversed by hill roads, river crossings and check-gates which were never intended to be able to withstand the level of contemporary trafficking networks (Savage, 2022). A new cast of characters has joined the mix: not poachers or customs officers, but algorithms. Geography and understaffing have created an enforcement gap that is being addressed by a range of products marketed

and in some instances, already used, as predictive policing models, camera-trap image classifiers, environmental DNA assays and computer-vision platforms. Asking what happens when artificial intelligence is rolled out in an enforcement system designed for the Wildlife (Protection) Act 1972 and India's membership of CITES is posing a question that is also particularly well-suited to the lens of green criminology, which has consistently prioritized harm over legal minutia.

Against this background, the paper pursues three objectives: first, to provide an overview of the magnitude and form of wildlife trafficking in North East India based on seizure records and empirical wildlife detection studies in India and beyond; second, to explore four families of AI tools currently utilized or being piloted in wildlife enforcement and the evidence on their

performance; and third, to consider the legal and social tensions created by these tools, especially for the communities living within, not beyond, the enforcement lens, including tribal communities and forest-dependent people. Section 1.1 reviews the theoretical lexicon of green criminology and considers the manner in which it extends to an AI-mediated enforcement context. Section 2 sets out the methodology, Section 3 presents the findings, Section 4 discusses their evidentiary and justice implications, and Section 5 concludes.

1.1 Green Criminology: A Theoretical Lens for the AI Era

Green criminology first came out of South's (1998) call for a criminological perspective that would be attuned to environmental harm as a product of any activity, criminal or otherwise, and was later formalised by Beirne and South (2007), who added harms to humanity and to other animals. Lynch's (1990) "treadmill of production" thesis brought a political-economic element to the study of environmental crime, instead of seeing it as an anomaly in the economy. White (2008) further separated environmental justice (concerned with human distributional fairness), from ecological justice (concerned with ecosystems as entities with their own integrity), and species justice (concerned with the standing of individual non-human animals), a threefold distinction more or less universally adopted in the field. The concept of species justice developed by Sollund (2011) is especially pertinent here as trafficking in animals is not just an issue of property being removed from the State, but an issue that concerns their welfare, and in a legal framework that is structured around ownership and status in relation to conservation, that welfare is often hidden.

To find AI in this picture, consider Wyatt's typology of wildlife trafficking (2013), based on interviews with offenders and analyses of cases. Opportunistic offenders, organised crime groups and state-sponsored actors all differ in their interactions with technology, and each can be targeted by the same image-recognition systems that have been developed and refined by

organised groups to avoid detection via photo manipulation, delays in shipments to areas when police are not on duty or by shifting communication to encrypted platforms that are not under AI policing.

Another uncomfortable question that green criminology raises is also related to harm, rather than legality: a green criminology reading of the question of AI enforcement tools would ask whose harm they are actually reducing, and where the harm is being shifted to. For example, a poaching-hotspot model could be created from historical patrol data to simply model and replicate the previous patterns of suspicion in relation to specific forest-fringe communities to create a policing outcome. This is a theme that comes up in this paper again and again: AI is not a "neutral" tool to be added to an existing toolbox of enforcement mechanisms, but a technology that redefines who is a suspect, a victim, and a source of legitimate knowledge.

2. Methodology

Design: The design adopted for the paper is qualitative, which was a mix of doctrinal legal analysis and a socio-legal review of secondary empirical evidence, interpreted within the framework of green criminology.

Primary Data: No human subjects primary data was collected for this study. Instead, the study is based on a purposive sample of three types of sources: (a) primary legal sources, such as the Wildlife (Protection) Act 1972 as amended in 2022, CITES, the Indian Evidence Act 1872 and the Bharatiya Sakshya Adhiniyam 2023 and the Digital Personal Data Protection Act 2023; (b) official and institutional seizure data, including the Wildlife Crime Control Bureau (2024) and TRAFFIC (2021); and (c) peer-reviewed empirical studies reporting the detection accuracy of AI tools in wildlife-trade contexts (Cardoso et al., 2023; Chang et al., 2023; Pirota et al., 2022), and regional reporting of trafficking routes in North East India (Mongabay India, 2022; Nature India, 2023; Scroll.in, 2022). Sources were chosen for their direct relevance to wildlife trafficking in

or through North East India and/or the ability of AI to be used in that area.

Analytical instruments: The principal analytical instrument is green criminology's harm-centred framework, namely the distinction White (2008) makes between environmental, ecological and species justice, and Sollund's (2011) account of species justice, interpreted as a lens on the concept, not as a measurement.

The study was conducted in four stages: (i) mapping trafficking routes and actors from the region that have been captured in trafficking seizures and regional trafficking reporting; (ii) categorising AI-enforcement tools into four families – forensic genomics; predictive risk-mapping; image recognition; trade and cargo monitoring; (iii) collecting accuracy figures reported in the empirical studies and comparing the conditions under which the tools have been tested with those under which trafficking occurs in the region; and (iv) analysing the statutory, constitutional and evidentiary provisions applicable to the use of the tools.

Data Analysis: Legal materials used doctrinal analysis which divided into two stages of textual and purposive interpretation. Qualitative thematic synthesis of seizure data and empirical studies were conducted, and the accuracy figures reported here are compared descriptively (Table 1) rather than pooled statistically as they vary in species, context and what is being measured.

3. Results

3.1 Wildlife Trafficking in North East India: Scale, Routes and Actors

North East India is a source as well as a transit area of trafficking of wildlife. There are species that are endemic to or pass through the area—including pangolins, otters, star tortoises and a range of birds, reptiles and mammals that are trafficked to other parts of Myanmar and to China for traditional medicine or as exotic pets (Savage, 2022). According to Nature India (2023), the highest number of pangolin seizures have been reported from the eastern and north-eastern states of West Bengal, Manipur, Mizoram and Assam with an estimated 3312 pangolins seized

in Manipur alone, a large number of which are reportedly seized in the Chandel district and carried on to Myanmar and China. During and after the COVID-19 pandemic, the Champhai district in Mizoram, particularly Khankawn check-gate along the NH-6, was found to be a hotspot of live exotic animal seizures as cockatoos, primates, tortoises and sloths have been confiscated in transit from Myanmar to mainland India through Assam and West Bengal (Mongabay India 2022, Scroll.in 2022).

These new lines run parallel to the older transit systems. According to Savage (2022) Imphal and Moreh in Manipur, Dimapur in Nagaland (due to its close proximity to Kaziranga National Park), Aizawl in Mizoram and Shillong in Meghalaya were long-established trading points, where movement was to the west via Siliguri and Darjeeling in West Bengal, and then through Sikkim to the Tibet Autonomous Region (TAR) via the Nathula Pass. It's the sort of place law enforcement and customs officials think their advantage lies with AI tools: It's big, it's far, it's a terrain they don't want to have to deal with, stand around with people, but it's not without a signal. Predictive modelling can be applied to take advantage of information gathered while the vehicles are moving, seasonal hunting patterns, and known check-gate chokepoints.

Geography is compounded by under-staffing. Forest officers, speaking to Scroll.in (2022) in Mizoram, described under-resourced and under-trained departments to deal with exotic and non-native species seized during raids, which could mean that even if a raid is successful it might end up in a 'welfare failure rather than a conservation success'. It's in this particular context – the doctrine behind the enforcement of the border is falling behind the dynamic of the trade route; the border is being extended; the system is under-resourced – that AI solutions are being proposed, and sometimes put into practice, as a force-

multiplier for a system that just cannot be fixed by more people.

3.2 Application of AI technology to detect and respond to wildlife trafficking

In the North East Indian context, there are four major applications of AI that can be considered: Forensic genomics, Predictive risk-mapping, Image recognition platforms, and AI monitoring of trade through online, cargo and courier monitoring. Environmental DNA and Forensic Genomics are also covered. Environmental DNA and Forensic Genomics are also introduced. In cases where it is not possible to identify species by morphological means such as powdered scales or bone fragments, species may be identified from DNA that can be detected in trace amounts in the soil, water or processed animal parts, or seized consignment, based on environmental DNA (eDNA) analyses. These genetic signatures are used to match them with these reference databases using a machine-learning system of classifiers, which takes significantly less time than the typical forensic backlogs in India might take to match traditional DNA/RNA or RNA sequence, which is essential for prosecution: according to the Wildlife (Protection) Act 1972, the seizure of such material to be matched with a scheduled species is a prerequisite for conviction. One of the few ways to make material that may otherwise be forensically ambiguous, traceable to the origin, is to use the ability of AI to assist in genomic identification.

3.2.1 Predictive Risk-Mapping and Poaching Hotspot Modelling

Predictive risk mapping takes into account terrain data, learning from patrol and seizure data using machine learning, and forecasting the likely location of trafficking or poaching, thus providing a more selective and effective deployment of limited ranger and customs resources than a set schedule of patrolling. Such systems, to prevent long sections of forested roads from having to be staffed at a single point, known as a check-gate, are appealing in a region where protected areas are equipped with them (Mongabay India, 2022). That same technique,

however, has the predictable drawback that a model trained on the location of past seizures will tell them where future seizures are likely to happen – whether there are seizures there or not, and whether they are where they have been looking for seizures or not.

3.2.2 Image-Recognition Platforms: Wildbook and Camera-Trap Computer Vision

For instance, the open-source Wildbook system uses computer vision models to identify single animals in pictures and to compare them with pre-existing pictures to estimate animal numbers without tagging, relying on natural marks (Wild Me, n.d.). Wildbook and other camera-trap classifiers are not traditionally used to help stop trafficking, but they do provide information about populations that can be used as a baseline to determine how much trafficking is going on without anyone realizing it, by looking at population declines. More importantly, research is growing in the field of trafficking detection that specifically concentrates on the trafficking images and their use of the same computer vision methods. Cardoso et al. (2023) optimized CNN models using images that are all available online and were able to achieve a successful recognition rate of over 90% of potential cases of pangolin trade in a test set of images, despite not being sufficiently high for automatic takedown or prosecution.

3.2.3. AI based monitoring of ICCs for trade, cargo and border crossing operations

The remaining tools relate to physical transportation of trafficked wildlife for cargo, mail and passenger transport. An AI algorithm and 3D X-ray tomography developed by Pirotta et al. (2022) for the detection of trafficked dead marine life like shark fin, seahorses and sea cucumbers proved effective and reliable; the algorithm achieved manual X-ray screening accuracy of between 86 and 96 percent when applied to luggage and to mail, respectively, depending on species. In a related area, Chang et al. (2023) found that existing object-detection techniques perform well on larger, more heat-distinct species, but not as well on smaller or

arboreal species, which is relevant in the context of the North East India where most of the animals being trafficked, including primates, small carnivores, and reptiles, are part of the less heat-distinct species category. Altogether, these studies suggest that the new screening technology which uses AI is increasingly effective for some types of trafficking, such as one involving large bodies and distinctively shaped cargo, and less effective for trafficking involving smaller bodies and living animals, which are also the most common type of trafficking in North East India's regional trade. The roles of business and the community in the housing market.

3. Challenges for the Canada-U.S. housing market.

Overall, the empirical evidence from India and other settings is mixed but telling. The Wildlife Crime Control Bureau (2024) reported 1652 wildlife seizures across the country in 2024, with approximately 40% of those seizures being of threatened species; and TRAFFIC (2021) found 141 wildlife seizure incidents at eighteen airports between 2011 and 2020, with most seizures

recorded at Chennai, Mumbai and Delhi and clear onward linkages with the north-eastern land border. Especially noteworthy is that neither of these statistics reflects any systematic contribution of the science of AI; both are the outcome of the traditional system of inspection, intelligence and interdiction, and it is clear that there is a long way to go in the practice of actual enforcement in India, compared to the scenarios that are envisioned in the conservation-technology literature.

The empirical literature reviewed above presents a more mixed technology-performance painting, in the form presented in Table 1. The classifiers for pangolins reported by Cardoso et al. (2023) were able to identify trade-related imagery with more than 90 per cent accuracy, the algorithm developed by Pirotta et al. (2022) for X-rays had accuracy ranging from 86 to 96 per cent for different species, and Chang et al. (2023) observed that object-detection models were effective for large, high-contrast species but not for smaller or camouflaged species.

Table 1 Reported Performance of AI Detection Tools in Wildlife-Trade Contexts

Study	AI tool or technique	Setting in which tested	Reported performance
Cardoso et al. (2023)	Convolutional neural network (CNN) image classifiers	Pangolin images from publicly accessible online platforms, in natural and market settings	More than 90% recognition of potential pangolin-trade images
Pirotta et al. (2022)	Automated algorithm with real-time 3D X-ray tomography	Luggage and mail containing marine wildlife products (shark fin, seahorses, sea cucumbers)	86–96% accuracy, varying by species
Chang et al. (2023)	Object-detection algorithms applied to drone thermal imagery	Aerial thermal surveys of wildlife	Effective for large, heat-distinct species; less effective for small, arboreal or camouflaged species

Note. Compiled by the authors from Cardoso et al. (2023), Pirotta et al. (2022) and Chang et al. (2023).

These pieces of data together suggest that the potential of these AI detection systems is great in a more limited scenario, such as a narrow, well-defined task like image classification of a known target species or X-ray screening of concealed cargo, but that perhaps it is not well established

whether or not they can carry over to the open, variable, live-animal trafficking environment typifying the Myanmar-Mizoram-Manipur corridor, where the variety of consignment content, including live animals and mobile animals, and the predominant transport modes

(road, rather than airport and cargo channels where these tools have already been tested), also typify the situation. The empirical gap, in short, is not only on the accuracy of the algorithms themselves, but on the domain where they are applied; the context where these algorithms have been developed and proven to be effective include curated image data (usually online) on websites, airport X-ray corridors and aerial thermal surveys while the context where trafficking in North East India happens include check-gates on the road and river.

3.5. Legal and Institutional Architecture: The Wildlife (Protection) Act, CITES and the Constitution

The main legislation related to wildlife in India is the Wildlife (Protection) Act, 1972, which categorizes species according to their level of protection and outlaws wildlife hunting, possession and trade and has been amended over the years, with the latest amendment in 2022 incorporating the schedules from CITES and provisions for the management of seized live wildlife. India has ratified CITES in 1976 and has undertaken to have international permits for the animals in CITES. In fact, implementation of international permits for listed species depends on the ability of the customs department and forest department. There is no specific mechanism for the enforcement of the Constitution; Article 48A says that the state should “protect and improve the environment”, while Article 51A(g) says that citizens have a “fundamental duty” to do the same, including “wildlife, forests, lakes” and to show “compassion” for “living creatures”. In this respect, the Wildlife Crime Control Bureau, which has been in existence since 2007 under the Ministry of Environment, Forest and Climate Change, is the most important agency for coordination of enforcement within the framework, and whose seizure data were discussed above is the best empirical documentation of trafficking in the public domain.

At the moment, there isn't a specific aspect of the architecture that will make the use of AI as an

enforcing tool difficult. The Wildlife (Protection) Act has not been drafted for algorithmic detection, predictive risk models or automated species identification, and CITES and the Constitution don't specify how the results of AI are incorporated into the prosecution, along with traditional forensic and witness evidence. In most jurisdictions, including India, environmental law, however, has yet to be fully embraced to give formal recognition to AI, and this is not uncommon practice. In the North East region, however, this lack is more pronounced as the ease of employing AI tools would lead to AI adoption in the region through pilot projects and donor-funded technology transfers, before any legislation or rule would be enacted to clarify the evidentiary status of AI.

4. Discussion

4.1 AI-Generated Evidence and the Indian Evidentiary Framework

In India, electronic evidence was admissible under section 65B of the Indian Evidence Act, 1872, which has now been replaced by the Bharatiya Sakshya Adhiniyam, 2023, where the corresponding provision is section 63. This provision was intended for conventional, digital-type records like call logs or CCTV footage, and its use in cases of outputs generated by a machine-learning model, a species match from an eDNA classifier, a computer-vision platform's ID of a trafficked pangolin in an image, or a predictive model's risk rating for a specific border segment has only been sparsely tested at Indian courts.

There are three questions of evidence that come to mind. First, is an AI classification a statement of fact, like a photograph, and should it thus be presented to the court by a competent expert witness or simply certified as such under the electronic-record rules? Second, if the model is proprietary, like many commercially available detection systems, how does the defence exercise its right to check the reliability of the method used to generate the evidence against it, a question that has obvious parallels with the use of algorithmic risk assessment tools in other

jurisdictions' criminal justice systems? Third, and most saliently for a region with a live and active trafficking route, what degree of accuracy would be legally acceptable – the roughly 90 percent accuracy rate reported by Cardoso et al. (2023) and Pirotta et al. (2022) would strike a strong balance in a conservation-technology paper, while a 10 percent error rate for a prosecutorial identification of a scheduled species would have direct implications for wrongful conviction – especially when the accused is not an organised trafficker but a subsistence forest-user.

In Indian jurisprudence, none of these questions has been addressed specifically, and for now AI-driven enforcement in North East India remains a legally undertheorized field: practical for intelligence gathering and allocation of patrolling, rules of evidence are relaxed in these areas; but not so much in the courtroom, where the Wildlife (Protection) Act's penalties truly matter.

4.2 Critical Concerns: Surveillance, Data Practices and Ecological and Species Justice

A green criminological analysis of AI-supported enforcement must go beyond simply technical accuracy and admissibility of evidence to consider who suffers the costs of the infrastructure needed for these tools. North East India's forests are not empty of people. In Nagaland, Manipur, Mizoram and Arunachal Pradesh, non-timber forest products, traditional subsistence hunting and pre-border kinship networks and trade are used by tribal and forest-dependent communities, before the creation of the international borders policed by AI-enabled check-gates. Predictive risk-mapping tools based on historical patrol and seizure data run the risk of embedding and reinforcing the suspicion of these communities in an apparently neutral algorithmic output, one that is tailored to the technicalities of machine learning but which, because of its automation, may seem objective and real-world.

The second related but separate issue is the use of image-recognition and drone-based monitoring for trafficked and/or endangered species, which inevitably entails the capture of human activities in and around a forest area, and

thus raises the issue of surveillance over communities who have no formal role nor any consent over the use of such monitoring. This tension is not merely coincidental and is also present in other aspects of the Indian legal landscape in relation to data protection, such as the Digital Personal Data Protection Act 2023, which has been silent on biometric-related data, like movement patterns collected as a by-product of wildlife monitoring systems.

Framed in this way, it is in productive tension with the environmental-justice concern for the lives and movements of those forest communities who are made newly visible by the same technologies used to protect trafficked animals, in Sollund's (2011) species-justice framework which insists that trafficked animals be treated as victims in their own right, and not merely as state property. A green criminology appropriate to the AI age must embrace both anxieties: the concern for wildlife trafficking that AI tools can effectively combat, and the fear of surveillance and misidentification that they can inflict on those who share their surroundings with the animal populations their tools are meant to protect, as the accuracy rates in Section 3.3 show they are not yet capable of doing.

4.3 Towards a Green Criminological Synthesis

The evidence provided in this paper does not lend itself to a "clean sweep" judgment about the advantages and disadvantages of using AI in wildlife conservation in North East India. It has clearly proven its ability to perform in well-defined narrow tasks such as image classification of known species in online trade content, X-ray screening of concealed cargo and genomic identification of processed animal material. Its use has not yet been tested in the real trafficking context in the region where open and variable trafficking using live animals is the norm, and the rules of Indian law concerning the admissibility of its products in court evidence are not yet certain. These infrastructures are disproportionately being shifted towards forest dependent and tribal communities who are

excluded from the design and implementation of these infrastructures.

A green criminological synthesis indicates that there are three directionalities. It is first important to note that a tool validated at the domain of curated images on the web or X-ray corridor of an airport is not equivalent to the domain of a highway check-gate at Champhai as this is an independent domain that requires local validation. Second, evidentiary reform should not fall behind the expanded use of AI; rather, it must be done in advance of the use of AI to interpret or revise section 63 of the Bharatiya Sakshya Adhiniyam, so that the use of AI output is clearly at its centre before prosecutions are based on it. Third, and most fundamentally, the enforcement architecture for AI in the region requires co-design with the communities that it will monitor, rather than design by technologists and enforcement agencies, so that the issues identified in this paper as being of environmental justice and species justice can be considered as constraints on design, not as critiques of the design.

4.4 Limitations

The study is based on secondary data and published empirical studies, many of which have been carried out away from the context of North East India and in different contexts (such as online imagery, X-ray corridors at airports, and aerial thermal surveys) away from the road and river trafficking routes in North East India, which means that the findings on the capability of AI are indicative rather than definitive for the region. Official seizure statistics do not necessarily represent the actual number of trafficking operations and seizures. The study also did not involve primary fieldwork with enforcement

officers or forest dependent communities, with whom the concerns raised in Section 4.2 would have to be tested.

5. Conclusion

There is a real situation of wildlife trafficking in North East India, as evidenced by the wildlife trafficking statistics from Wildlife Crime Control Bureau and TRAFFIC and the geographic scope of the problem as well as the limited capacity for demand reduction and enforcement by any one intervention. Empirical experience also suggests that AI can perform some aspects of the enforcement role, but as outlined in this paper, experience in the region's actual operating environment limits the effectiveness of AI, and missing a final legal framework for the use of AI as evidence. The surveillance 'price' is the price that some pay for the gain that others reap, and the extent to which the current level of accuracy that these surveillance systems afford is sufficient for the human and legal consequences that are increasingly built on them is a significant issue to examine using the concepts of 'green criminology' which has a long history of interest in harm rather than novelty of law or technology.

The paper thus suggests independent local validation of AI tools, the requirement of evidence reform prior to the use of AI tools in prosecuting cases, and co-design of enforcement structures with the communities they are monitoring (Section 4.3). Future studies should involve testing AI detection tools in the operational environment of the region, at the road and river check-gates and on live consignment, and report on experience of forest-dependent communities being monitored with AI.

6. References

- Beirne, P., & South, N. (Eds.). (2007). *Issues in green criminology: Confronting harms against environments, humanity and other animals*. Willan Publishing.
- Bharatiya Sakshya Adhiniyam, No. 47 of 2023, § 63 (India).
- Cardoso, A. S., Bryukhova, S., Renna, F., Reino, L., Xu, C., Xiao, Z., Correia, R., Di Minin, E., Ribeiro, J., & Vaz, A. S. (2023). Detecting wildlife trafficking in images from online platforms: A test case using deep learning with pangolin images. *Biological Conservation*, 279, Article 109905. <https://doi.org/10.1016/j.biocon.2023.109905>

- Chang, M., Vuong, T., Palaparthi, M., Howell, L., Bonti, A., Abdelrazek, M., & Nguyen, D. T. (2023). *An empirical study of automatic wildlife detection using drone thermal imaging and object detection* [Preprint]. arXiv. <https://arxiv.org/abs/2310.11257>
- Constitution of India, art. 48A, 51A(g).
- Convention on International Trade in Endangered Species of Wild Fauna and Flora, Mar. 3, 1973, 993 U.N.T.S. 243.
- Digital Personal Data Protection Act, No. 22 of 2023 (India).
- Indian Evidence Act, No. 1 of 1872, § 65B (India).
- Lynch, M. J. (1990). The greening of criminology: A perspective for the 1990s. *The Critical Criminologist*, 2(3), 1–4, 11–12.
- Mongabay India. (2022, September 15). *Champhai district in Mizoram is now a hotspot for wildlife trafficking in India*. <https://india.mongabay.com/2022/09/champhai-district-in-mizoram-is-now-a-hotspot-for-wildlife-trafficking-in-india/>
- Nature India. (2023, December 13). *Illegal pangolin trade continues unabated in India*. <https://www.nature.com/articles/d44151-023-00194-x>
- Pirotta, V., Shen, K., Liu, S., Phan, H. T., O'Brien, J. K., Meagher, P., Mitchell, J., Willis, J., & Morton, E. (2022). Detecting illegal wildlife trafficking via real time tomography 3D x-ray imaging and automated algorithms. *Frontiers in Conservation Science*, 3, Article 757950. <https://doi.org/10.3389/fcsc.2022.757950>
- Savage, M. (2022). Otters in Northeast India: A review of the sparse available information. *IUCN Otter Specialist Group Bulletin*, 39(2), 81–89.
- Scroll.in. (2022, August 28). *How the pandemic has driven a surge in wildlife smuggling through North East India*. <https://scroll.in/article/1031395/how-the-pandemic-has-driven-a-surge-in-wildlife-smuggling-through-north-east-india>
- Sollund, R. (2011). Expressions of speciesism: The effects of criminalization of wildlife trafficking. *Crime, Law and Social Change*, 55(5), 437–451. <https://doi.org/10.1007/s10611-011-9296-3>
- South, N. (1998). A green field for criminology? A proposal for a perspective. *Theoretical Criminology*, 2(2), 211–233. <https://doi.org/10.1177/1362480698002002004>
- TRAFFIC. (2021). *High flying: Insight into wildlife trafficking through India's airports*. TRAFFIC International.
- White, R. (2008). *Crimes against nature: Environmental criminology and ecological justice*. Willan Publishing.
- Wild Me. (n.d.). *Wildbook: AI-powered wildlife identification platform*. Conservation X Labs. Retrieved August 25, 2026, from <https://www.wildme.org/wildbook.html>
- Wildlife Crime Control Bureau. (2024). *Annual report 2024*. Ministry of Environment, Forest and Climate Change, Government of India.
- Wildlife (Protection) Act, No. 53 of 1972 (India), as amended 2022.
- Wyatt, T. (2013). *Wildlife trafficking: A deconstruction of the crime, the victims, and the offenders*. Palgrave Macmillan.

7. Author Declaration

The authors confirm that this manuscript is their original work and that all sources used have been duly acknowledged. The authors declare that they have no conflicts of interest.