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ENVIRONMENTAL CRIMINOLOGY: PROFILING SPATIAL PATTERNS OF TRANSNATIONAL GREEN CRIMES

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ABSTRACT

Green crimes rarely stay where they start. Timber is cut in one country, laundered through a processing plant in a second and sold in a third; toxic slops are loaded in a European port and surface on the streets of an African city. This paper asks a fairly simple question: can the tools of environmental criminology, built mostly to explain burglary and street robbery at the neighbourhood scale, be stretched to explain crime that is organised across continents? Using a doctrinal and secondary-source method, it reads routine activity theory, rational choice, crime pattern theory and green criminology against a set of decided cases and documented episodes, including the Probo Koala dumping, the Lacey Act prosecutions, the Tanzanian ivory trial of Yang Fenglan, Kiobel and Okpabi, the Indian Supreme Court's hazardous-waste orders, and the ICJ's decisions in Pulp Mills and Costa Rica v Nicaragua. The argument is that spatial profiling is useful only when place is treated as a chain of linked nodes rather than a single hot spot, and that courts have often moved faster than legislatures in building the accountability such a chain demands. The paper closes with a critical assessment of persistent gaps (weak data, displacement, corporate impunity, the unsettled status of ecocide) and a few modest proposals.

Keywords: environmental criminology; green criminology; transnational environmental crime; crime pattern theory; spatial analysis; wildlife trafficking; hazardous waste; ecocide

1. INTRODUCTION

Estimates of what environmental crime is worth are, by nature, rough. UNEP and INTERPOL put the annual value at somewhere between US$91 and US$258 billion (Nellemann et al., 2016), and the Financial Action Task Force later suggested that illegal logging, wildlife trafficking, illegal fishing, illegal mining and waste crime together generate roughly US$110–

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281 billion a year in proceeds (FATF, 2021). Nobody should treat these numbers as precise. What they do show is that green crime is now one of the larger criminal economies, and that it sits close to corruption, fraud and money laundering[1].

Two features make it hard to study with conventional criminology. First, the harm and the offender are usually far apart. A poacher in a national park and a buyer of carved ivory in a distant city are linked by a supply chain, not by geography. Second, the legal order that is supposed to respond is fragmented: national statutes, regional directives and treaties such as CITES (1973), the Basel Convention (1989) and the UN Convention on the Law of the Sea (1982) each cover a slice of the problem[2].

A note on terms. "Green crime" is used here for acts that are unlawful under national or international law and that damage ecosystems, species or human health through environmental degradation. Green criminology, following South (1998) and White (2011), is wider and also asks about harms that are legal but still destructive. The paper keeps to unlawful conduct for the main analysis and returns to the legal-but-harmful question in the critical section.

Research questions-

a) What spatial regularities can be identified in transnational green crime, and how well do mainstream environmental-criminological theories explain them?
b) What do decided cases tell us about how those patterns are being addressed?
c) Where are the principal gaps, and w hich trends are likely to matter next?

Method and limits- The study is doctrinal and library-based. It draws on treaty texts, reported judgments, institutional reports (UNODC, UNEP–INTERPOL, FATF) and peer-reviewed scholarship. It does not run original geospatial analysis, and the cases were chosen purposively to illustrate different crime types and legal systems, not to be a representative sample. Both limits should be kept in mind when reading the conclusions.

2. THEORETICAL FRAMEWORK

2.1 Environmental criminology and its spatial core

The starting point is the claim by Brantingham and Brantingham (1981) that crime is not randomly spread. Offenders move through routine activity spaces: homes, workplaces, leisure sites and the paths between them. Their later crime pattern theory describes *nodes* (where

[1] FATF, 2021.
[2] CITES (1973), the Basel Convention (1989) and the UN Convention on the Law of the Sea (1982)

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people go), *paths* (how they get there) and *edges* (boundaries where different zones meet), and predicts that offences cluster where an offender's awareness space overlaps with attractive opportunities (Brantingham and Brantingham, 1993). Applied to green crime, a forest boundary, a port or a river crossing is not just scenery. It is a node or an edge that shapes who offends and where[3].

2.2 Routine activity theory

Cohen and Felson (1979) [4]argued that a crime needs three things to converge in time and space: a motivated offender, a suitable target and the absence of a capable guardian. The framework travels well. A remote reserve with a handful of rangers, a fishing ground with no patrol vessel or a port with no inspector who can recognise a hazardous waste manifest all describe the same problem, namely missing guardianship. The theory also explains why enforcement at one point of a chain can be undone by weak guardianship at another.

2.3 Rational choice and crime scripts

Rational choice perspectives treat offending as a decision shaped by perceived effort, risk and reward (Cornish and Clarke, 1986). Cornish (1994) added the idea of the *crime script*, a step-by-step account of how an offence is prepared, carried out and concluded. Scripts are useful for green crime because they expose the many intermediate steps (permits, mislabelled cargo, bribes, payment routes) where prevention can bite. Clarke's (1999) CRAVED model of "hot products" (concealable, removable, available, valuable, enjoyable, disposable) has been adapted to illegal wildlife markets by Moreto and Lemieux (2015), and Lemieux and Clarke (2009) used a situational lens to examine how the 1989 international ivory ban related to elephant poaching in Africa[5].

2.4 Hot spots and concentration

Sherman, Gartin and Buerger (1989) showed that a small share of places generates a large share of predatory crime, and Weisburd (2015) later described this as a "law of crime concentration". For green crime the lesson is practical: protected areas, river stretches, ports and fishing zones

[3] Brantingham, P.J. and Brantingham, P.L. (1981) *Environmental Criminology*. Beverly Hills: Sage, Brantingham, P.L. and Brantingham, P.J. (1993) 'Environment, routine and situation: toward a pattern theory of crime', in Clarke, R.V. and Felson, M. (eds) *Routine Activity and Rational Choice: Advances in Criminological Theory*, vol. 5. New Brunswick: Transaction, pp. 259–294.
[4] Cohen and Felson (1979)
[5] Cohen, L.E. and Felson, M. (1979) 'Social change and crime rate trends: a routine activity approach', American Sociological Review, 44(4), pp. 588–608, Cornish, D.B. (1994) 'The procedural analysis of offending and its relevance for situational prevention', Crime Prevention Studies, 3, pp. 151–196.

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are not equally risky, so patrol and inspection resources can be targeted.

2.5 Green criminology and the treadmill of production

Lynch (1990) and South (1998) pushed criminology to take environmental harm seriously. Later work links it to political economy. Schnaiberg's (1980) treadmill of production holds that capitalist economies keep expanding extraction and output, and Stretesky, Long and Lynch (2013) extend that to crime: the pressure to cut costs pushes firms toward cheaper, riskier disposal and sourcing. White (2011) proposed an "eco-global" criminology that follows harm across borders. Gibbs, Gore, McGarrell and Rivers (2010) offered *conservation criminology* as a bridge between criminology, natural resource management and risk analysis[6].

2.6 Displacement

Prevention in one place may push crime elsewhere. Reppetto (1976) listed five forms: temporal, tactical, target, territorial and functional. A review of situational-prevention evaluations found that displacement is far from inevitable and is often smaller than the benefits, with diffusion of benefits also reported (Guerette and Bowers, 2009). For transnational green crime, though, territorial displacement across a regulatory gradient is exactly what a trader with a ship or a shipping container can do.

3. PROFILING THE SPATIAL PATTERNS

3.1 A node-based model

A useful way to profile transnational green crime is to follow the commodity. Most chains have a *source node* (where the resource is taken or the waste is produced), one or more *transit and laundering nodes* (ports, free zones, processors, shell companies) and a *destination node* (where it is sold, consumed or dumped). Hot spots exist at each node, but they are different kinds of hot spot and call for different guardians.

- **Wildlife and ivory.** Analyses of seizure data reported to CITES have repeatedly pointed to a small number of container ports and air hubs as transit points, a pattern also discussed in UNODC's *World Wildlife Crime Report* [7](UNODC, 2020). The Tanzanian case below is one example.
- **Timber.** Lawson and MacFaul (2010) described how illegally harvested logs can be

[6] Lynch, M.J. (1990) 'The greening of criminology: a perspective on the 1990s', The Critical Criminologist, 2(3), pp. 11–12.
[7] UNODC's *World Wildlife Crime Report*

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given a legal appearance by passing them through processing countries before re-export, which is why consumer-country controls matter.

- **Fisheries.** Satellite tracking of vessels has revealed large-scale fishing effort and gaps in transponder signals that can indicate concealed activity (Kroodsma et al., 2018). Transshipment at sea and landing at lightly regulated ports are the key transit nodes.
- **Mining.** Asner and Tupayachi (2017) documented accelerated forest loss from gold mining inside protected areas in the Peruvian Amazon, a clear example of a source-node hot spot in a low-guardianship area.
- **Waste.** Flows run along a regulatory gradient, from jurisdictions with high disposal costs toward those with weak oversight.

Crime type	Typical source node	Typical transit / laundering node	Typical destination node	Dominant theoretical lens
Wildlife and ivory trafficking	Biodiverse range states with thin ranger coverage	Container ports, air hubs, border markets	Consumer markets in Asia, Europe, North America	Routine activity; CRAVED; crime scripts
Illegal logging	Tropical forest concessions	Third-country processing and re-export	Furniture and construction markets	Rational choice; guardianship; timber laundering
IUU fishing	Distant fishing grounds, EEZs of weak states	Transshipment at sea; ports of convenience	Large seafood importers	Hot spots at sea; place management; flag-state failure
Hazardous and plastic waste	Industrialised exporters	Brokers; mislabelled "recyclables"	States with weak regulation	Displacement; treadmill of production
Illegal gold mining	Protected or Indigenous lands	Informal dealers, refineries	Jewellery, electronics, finance	Hot spots; green criminology

3.2 The governance gradient

The common thread across the table is that crime flows toward the lowest capable guardianship. That may mean weak enforcement, corruption, thin budgets or gaps in the law. It also means that spatial profiling for green crime cannot rely on physical geography alone. A

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map of *regulatory* space (who can inspect, who can prosecute, who is bribable) often predicts offending better than a map of forest cover.

4. SELECTED CASES AND THEIR THEORETICAL READING

4.1 The Probo Koala (Trafigura), Côte d'Ivoire, 2006

Facts. In 2006 the tanker *Probo Koala*, chartered by the trading company Trafigura, carried caustic-contaminated slops from fuel washing. After a quoted treatment price in Amsterdam proved higher than expected, the waste was pumped back aboard and the ship sailed on. In August 2006 it was handed to a local contractor in Abidjan, which dumped the material at multiple sites around the city. Official figures attributed around fifteen deaths and over a hundred thousand medical consultations, although estimates differ.

Outcomes. Trafigura agreed a settlement with the Ivorian government in 2007 (reported at roughly US$198 million) and settled a UK group claim in 2009 for about £30 million. In the Netherlands, the Amsterdam District Court (23 July 2010) convicted Trafigura of illegally exporting waste and concealing its harmful nature, and the Amsterdam Court of Appeal upheld the conviction (23 December 2011).

Theoretical reading. This is a textbook case of territorial displacement along a regulatory and cost gradient. The decision to avoid the Amsterdam price fits a rational-choice account; the absence of a capable guardian at the destination fits routine activity theory; and the pressure to cut disposal costs fits the treadmill-of-production argument. Crucially, the legal consequences came through the *source* state's courts and private litigation, not through the destination state[8].

4.2 United States v McNab, 331 F.3d 1228 (11th Cir. 2003), and the Gibson Guitars matter

Facts and holding. McNab concerned the import of Honduran spiny lobster tails in violation of Honduran regulations. The Lacey Act makes it unlawful to import wildlife taken in violation of foreign law, and the Eleventh Circuit upheld the convictions despite arguments that the Honduran rules were invalid under Honduran law. In 2012 Gibson Guitars entered a criminal enforcement agreement with US authorities over imports of Madagascan ebony and Indian rosewood under the amended Lacey Act, paying a penalty of about US$300,000 and forfeiting wood.

Theoretical reading. These matters show the idea of extending guardianship along the chain:

[8] The Probo Koala (Trafigura), Côte d'Ivoire, 2006

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a destination state treats the foreign legal breach as its own offence. They also show the friction that comes with it, because the ruling meant foreign law, and doubts about its validity, were litigated in a US courtroom[9].

4.3 The "Ivory Queen" trial, Tanzania, 2019

Yang Fenglan, a Chinese businesswoman, and two Tanzanian co-accused were convicted in Dar es Salaam in February 2019 of leading a criminal network that trafficked large quantities of ivory over many years, and each received a fifteen-year sentence. The prosecution was framed as organised crime, in line with the logic of the UN Convention against Transnational Organized Crime (2000). For crime script analysis it is revealing: the network's route ran from poaching areas, through intermediaries and ports, toward Asian markets, and it was disrupted at a mid-chain node[10].

4.4 China's 2018 import restriction and the shift of plastic waste

When China restricted imports of most plastic waste in 2018 (the "National Sword" policy), shipments moved to other importers in South and Southeast Asia, several of which later turned shipments back or tightened controls. The Basel Convention's plastic waste amendments entered into force on 1 January 2021. This is a clean illustration of displacement: closing one door redirects the flow, and the effect lasts only as long as the next set of states can resist it[11].

5. THE PRESENT SCENARIO: PROGRESS, GAPS, AND EMERGING TRENDS

5.1 Progress

- **Treaty and policy momentum.** The Basel Ban Amendment entered into force in December 2019; the FAO Port State Measures Agreement took effect in June 2016 and gives port states tools against IUU catches; the UN General Assembly adopted Resolution 69/314 (2015) on illicit wildlife trafficking and Resolution 76/300 (2022) recognising a right to a clean, healthy and sustainable environment.
- **Criminal law in regional systems.** The EU replaced Directive 2008/99/EC with Directive (EU) 2024/1203, which widens the list of offences, raises penalties and includes provisions for offences described as comparable to ecocide (EU, 2024).

[9] United States v McNab, 331 F.3d 1228 (11th Cir. 2003),
[10] The "Ivory Queen" trial, Tanzania, 2019
[11] Basel Convention.

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- **Follow-the-money.** The FATF (2021) report pushed environmental crime onto the anti-money-laundering agenda, recognising that tackling proceeds may succeed where tackling harvesters does not.
- **Technology.** Open satellite platforms and vessel-tracking data now let researchers and enforcers observe forests and fleets at a scale that was impossible a decade ago (Kroodsma et al., 2018).
- **Domestic legislation.** In India, for instance, the Wildlife (Protection) Amendment Act 2022 brought CITES-listed species into domestic law.

5.2 Gaps

- **Data.** Seizure and arrest statistics tell us as much about enforcement effort as about crime. There is a large dark figure, and most of it sits in the places with the least capacity to measure it.
- **A scale problem in theory.** Crime pattern theory was developed for offenders who travel short distances. Applying it to an ivory network that spans three continents requires adaptation that the literature has only begun to supply.
- **Corporate and state actors.** Much enforcement targets the poacher, the logger or the courier. Corporate parents, financiers and complicit officials are prosecuted far less often.
- **Definitional inconsistency.** The same act (say, exporting mislabelled waste) may be a crime in one state, a regulatory breach in another and legal in a third. Under UNTOC, environmental offences qualify only where they meet the "serious crime" penalty threshold, which many national laws do not.
- **Destination-state enforcement.** Consumer states often have lighter penalties and lower prosecution priority than source states, though they sit at the node where demand is created.

5.3 Emerging trends

- **Ecocide.** In 2021 an Independent Expert Panel proposed defining ecocide as unlawful or wanton acts committed with knowledge of a substantial likelihood of severe and either widespread or long-term damage to the environment (Independent Expert Panel, 2021). Vanuatu and other states have pressed for an amendment of the Rome Statute, and Belgium has moved to place ecocide in its national criminal code.

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- **Online markets and digital finance.** Wildlife and timber are increasingly advertised through social platforms, and payments can be routed through informal or crypto channels, which complicates both spatial profiling and the follow-the-money approach.
- **The energy transition.** Demand for critical minerals creates new pressure on forests and Indigenous lands, and the carbon-credit market creates new fraud risks.
- **Climate and displacement of offending.** Shifting habitats and fish stocks move the geography of both resource and enforcement.

6. JUDICIAL CONTRIBUTIONS

Legislatures have been slow to draft rules for crime that crosses borders. Courts, faced with actual disputes, have often filled the gap. The contributions fall into four groups.

6.1 International courts and tribunals

- ***Trail Smelter*** **(United States v Canada) (1941) 3 RIAA 1905.** Fumes from a smelter at Trail, British Columbia, damaged land in Washington State. The arbitral tribunal held that a state may not allow its territory to be used in a way that causes serious injury to another state's territory. It remains the root of the prevention principle in transboundary harm[12].
- ***Gabčíkovo-Nagymaros Project*** **(Hungary/Slovakia), ICJ Reports 1997, p 7.** The ICJ accepted that new environmental norms must be taken into account when applying older treaties, and the concept of sustainable development entered its reasoning, with Judge Weeramantry's separate opinion often cited for the point.
- ***Pulp Mills on the River Uruguay*** **(Argentina v Uruguay), ICJ Reports 2010, p 14.** The Court treated environmental impact assessment as a requirement that has come to be accepted in general international law where a project risks significant transboundary harm. It found that Uruguay had breached procedural duties of notification and consultation but not the substantive obligations, and it declined to order the plant dismantled[13].
- ***Whaling in the Antarctic*** **(Australia v Japan: New Zealand intervening), ICJ Reports 2014, p 226.** The Court reviewed objectively whether Japan's programme was "for purposes of scientific research" and concluded it was not. The case matters for

[12] *Trail Smelter* (United States v Canada) (1941) 3 RIAA 1905
[13] *Pulp Mills on the River Uruguay* (Argentina v Uruguay), ICJ Reports 2010, p 14

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green crime because it shows that a state's own label for an activity does not settle its lawfulness.

- ***South China Sea Arbitration*** **(Philippines v China), PCA Case No 2013-19, Award of 12 July 2016.** The tribunal found that China had breached its UNCLOS duties to protect and preserve the marine environment (including Articles 192 and 194(5)) through large-scale reclamation and the harvesting of endangered species[14].
- ***Certain Activities Carried Out by Nicaragua in the Border Area*** **(Costa Rica v Nicaragua), Compensation, ICJ Reports 2018, p 15.** For the first time the ICJ awarded compensation for environmental damage as such, including loss of the goods and services a damaged ecosystem would have provided. The sum, a little under US$380,000 in total, was modest, but the principle was significant[15].
- ***The Volga*** **(Russia v Australia), ITLOS Case No 11, Judgment of 23 December 2002.** A prompt-release case arising from the arrest of a Russian-flagged vessel fishing for Patagonian toothfish in Australia's zone near Heard Island. It clarified the relationship between coastal-state enforcement against illegal fishing and the flag state's rights.
- ***Request for an Advisory Opinion Submitted by the SRFC,*** **ITLOS Case No 21 (2015).** The tribunal held that flag states must take the measures necessary to ensure that vessels flying their flag do not engage in IUU fishing in other states' zones, and that a failure of due diligence can ground international responsibility.
- **Advisory opinions on climate change.** ITLOS (Case No 31, 21 May 2024) and the ICJ (23 July 2025) have each spelled out states' obligations concerning climate change and the marine environment. They are not about criminal conduct as such, but they tighten the standard of due diligence against which a state's tolerance of environmental harm will be judged. The Inter-American Court's Advisory Opinion OC-23/17 (2017) likewise tied environmental protection to human rights and recognised jurisdiction over transboundary harm.

6.2 The Indian Supreme Court

India's apex court has arguably done more than any other national court to turn constitutional rights into environmental enforcement.

[14] *South China Sea Arbitration* (Philippines v China), PCA Case No 2013-19, Award of 12 July 2016
[15] Costa Rica v Nicaragua), Compensation, ICJ Reports 2018, p 15

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- ***M.C. Mehta v Union of India* (1987) 1 SCC 395 (Oleum Gas Leak).** After a gas leak in Delhi, the Court laid down a rule of *absolute liability* for enterprises engaged in hazardous activities, going beyond the English rule in *Rylands v Fletcher* by removing the exceptions[16].
- ***Indian Council for Enviro-Legal Action v Union of India* (1996) 3 SCC 212.** Concerning chemical plants that poisoned land and water in Bichhri, Rajasthan, the Court applied the polluter-pays principle and ordered the cost of remediation to be recovered from the industries responsible[17].
- ***Vellore Citizens' Welfare Forum v Union of India* (1996) 5 SCC 647.** On tannery pollution in Tamil Nadu, the Court held that the precautionary principle and the polluter-pays principle are part of the environmental law of the country, and linked them to sustainable development[18].
- ***T.N. Godavarman Thirumulpad v Union of India* (1997) 2 SCC 267.** The order of 12 December 1996 gave "forest" a wide, dictionary-based meaning for the purposes of the Forest (Conservation) Act and began a long-running "continuing mandamus" under which the Court supervises forest governance, including timber movement[19].
- ***Research Foundation for Science, Technology and Natural Resource Policy v Union of India* (2005) 10 SCC 510, and (2007) 15 SCC 351.** In these proceedings the Court examined the import of hazardous wastes and the dismantling of the decommissioned vessel known as the *Blue Lady* (formerly the *Clemenceau*), drawing on India's Basel Convention obligations and appointing technical committees. They are among the clearest examples of a domestic court acting as a destination-state guardian[20].

The Wildlife (Protection) Act 1972 and the National Green Tribunal Act 2010 supplement this case law, the Tribunal being a specialised forum with technical members.

6.3 Courts in the Global North: extraterritoriality and corporate responsibility

- ***Kiobel v Royal Dutch Petroleum Co,* 569 U.S. 108 (2013).** Nigerian plaintiffs from Ogoniland sued Shell companies under the Alien Tort Statute over complicity in abuses in the Niger Delta, an area whose oil contamination was later documented by UNEP

[16] ***M.C. Mehta v Union of India* (1987) 1 SCC 395**
[17] ***Indian Council for Enviro-Legal Action v Union of India* (1996) 3 SCC 212**
[18] ***Vellore Citizens' Welfare Forum v Union of India* (1996) 5 SCC 647**
[19] ***T.N. Godavarman Thirumulpad v Union of India* (1997) 2 SCC 267.**
[20] ***Research Foundation for Science, Technology and Natural Resource Policy v Union of India* (2005) 10 SCC 510, and (2007) 15 SCC 351.**

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(2011). The Supreme Court applied the presumption against extraterritorial application of US statutes and held that claims must "touch and concern" US territory with sufficient force, which sharply limited this route.

- ***Vedanta Resources plc v Lungowe* [2019] UKSC 20.** Zambian villagers alleged pollution from the Nchanga copper mine, run by a Zambian subsidiary of an English parent. The UK Supreme Court allowed the claim to proceed in England and held that a parent's duty of care towards those affected by a subsidiary depends on how far it actually intervenes in, or controls, the subsidiary's operations[21].
- ***Okpabi v Royal Dutch Shell plc* [2021] UKSC 3.** Niger Delta communities sued the Shell parent over oil pollution by its Nigerian subsidiary. The Supreme Court held the claims arguable, noting that published group policies and the level of parent involvement could found a duty of care.
- ***Oguru, Efanga and Milieudefensie v Royal Dutch Shell and SPDC*, Court of Appeal of The Hague, 29 January 2021.** The Dutch court found the Nigerian subsidiary liable for oil spills in two villages and ordered the parent to install leak-detection equipment at one site, which is a rare example of an injunction directed at a parent[22].
- ***Milieudefensie v Royal Dutch Shell plc*, District Court of The Hague, 26 May 2021 (C/09/571932).** The court held that the parent company had a duty under Dutch law to reduce the group's emissions by 45% (net) by 2030 against 2019. On appeal in November 2024, The Hague Court of Appeal accepted that Shell has a duty to reduce emissions but set aside the specific percentage. The pair of decisions shows how quickly judicial progress can be trimmed.
- ***United States v McNab* (see 4.2)** completes this group by showing the destination-state approach through a criminal statute.

6.4 Rights of nature

In Colombia, the Constitutional Court in Judgment T-622 of 2016 recognised the Atrato River as a subject of rights, with guardians appointed to represent it, in a case about illegal mining and its effect on riverine communities. The Colombian Supreme Court reasoned in a similar way about the Amazon in 2018 (STC4360-2018). These decisions matter for green criminology because they treat the environment as a victim in its own right, which is the standpoint the field

[21] *Vedanta Resources plc v Lungowe* [2019] UKSC 20
[22] *Oguru, Efanga and Milieudefensie v Royal Dutch Shell and SPDC*, Court of Appeal of The Hague, 29 January 2021.

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has long argued for.

7. CRITICAL ANALYSIS

7.1 Does the theory scale?

Routine activity and crime pattern theories give us a vocabulary, but they were built for offenders who commit crimes near where they live. A trafficking network is not constrained in that way, and its decisions are shaped by prices, border controls and bribery risk. The node-based model used in this paper is therefore best understood as an *extension* of the classic theories, not a proof of them, and the evidence for it comes largely from case studies. Whether the theories predict where the next hot spot will appear is a different matter that this paper cannot settle.

7.2 The politics of measurement

Seizure data are produced by enforcement agencies, so they measure attention as much as offending. A port that scans more containers will report more seizures. Spatial profiling that treats those data as a direct picture of crime risks mistaking where we look for where the harm is. Remote sensing and vessel tracking help, but they capture only certain crimes (forest loss, fishing effort) and say little about, for instance, the concealment of hazardous waste inside legitimate trade.

7.3 Displacement and the limits of territorial thinking

The plastic-waste and Probo Koala episodes both show territorial displacement, while the shift from tropical timber to other species or from wildlife products to online sales shows tactical and target displacement. The evidence reviewed by Guerette and Bowers (2009) suggests displacement is often smaller than feared, but that research mostly concerns local interventions. Whether the same holds for globally mobile commodity chains is a real gap, and a prudent policy should assume at least partial displacement.

7.4 Whose crime gets policed?

Critical scholars point out that enforcement tends to land hardest on the people at the source end of the chain: rural hunters, small-scale loggers, artisanal miners. Financiers, traders and corporate buyers are harder to reach (White, 2011; Sollund, 2019). Conservation enforcement has also been criticised for displacing Indigenous and local communities, and many of those same communities are themselves victims of environmental crime. Global Witness (2024)

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recorded close to two hundred killings of land and environmental defenders in a single year, which shows that the people protecting the environment are often exposed to violence by those exploiting it. A spatial analysis that does not ask who lives at the hot spot will miss this.

7.5 Courts: strengths and limits

The case law above is impressive, but it has limits. *Godavarman* shows both the energy and the risks of continuing mandamus: the Court has secured protection for forests, but it has also been criticised for taking over executive functions without the institutional machinery to run them. *Kiobel* closed a door that *Vedanta* and *Okpabi* have partly reopened, and the 2024 reversal in the Shell climate case shows how fragile a headline result can be. International tribunals are mainly concerned with state responsibility, and their remedies, such as the modest sum in *Costa Rica v Nicaragua*, are small compared with the harm. In general, courts react to harm after it has happened, while the spatial approach in this paper is about prevention.

7.6 Ecocide: promise and risk

An international crime of ecocide could reach corporate decision-makers and add a symbolic and deterrent layer. But the proposed threshold (severe and either widespread or long-term damage, with knowledge of a substantial likelihood) is high and requires a judgment about whether the social and economic benefits were clearly excessive, so it may catch only the most spectacular cases. The International Criminal Court also has limited resources and no police force. Ecocide may therefore be a useful addition, but it is not a substitute for the dull work of customs inspections, financial investigation and national prosecutions.

7.7 Limits of this paper

The analysis relies on secondary sources and a purposive set of cases. Several figures (market value estimates, casualty numbers, settlement sums) are contested or reported differently in different sources, and the picture of a fast-moving field, ecocide in particular, may have changed since this was written. A stronger version of the study would add original spatial data, for example seizure records geocoded to ports and routes.

8. CONCLUSION AND RECOMMENDATIONS

The central claim of this paper is modest. Environmental criminology can help explain transnational green crime, but only if it treats place as a chain of nodes and accepts that the most important “place” is often regulatory rather than physical. The cases bear this out.

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Trafigura's waste moved along a cost gradient; ivory moved through a handful of nodes before it reached buyers; plastic waste moved when one door closed. In every example the legal response that worked best was at a node other than the one where the harm occurred.

Four recommendations follow.

1) **Profile chains, not sites.** Enforcement agencies and researchers should map source, transit and destination nodes together, and share data across them.
2) **Strengthen destination-state enforcement.** Following the logic of the Lacey Act and the Basel Convention, consumer and importing states should treat foreign illegality in supply chains as a domestic offence and resource their customs and prosecution services accordingly.
3) **Follow the money and the parent company.** Financial investigation and parent-company liability, as developed in *Vedanta* and *Okpabi* and encouraged by the FATF (2021), reach actors who never touch the resource.
4) **Involve source communities.** Enforcement and conservation measures should be designed with the local and Indigenous people who live at the hot spots, both because they are often victims and because their knowledge is itself a form of guardianship.

Future research should test the node-based model against geocoded enforcement data, evaluate displacement over global supply chains, and examine how the new EU directive and any ecocide amendment work in practice.

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