The Green-Collar Matrix: An Empirical Analysis of the Tripartite Nexus among Environmental Crime, Corruption and Money Laundering in India's Real Estate Sector

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Abstract

This paper introduces the Green-Collar Matrix as a conceptual and empirical tool for understanding the tripartite nexus through which environmental crimes, institutional corruption and money laundering reinforce one another within India's construction and property markets. Drawing on a mixed-methods design that combines panel data analysis across 121 Indian districts (2010–2023), forensic analysis of six landmark legal proceedings, and content analysis of enforcement records from multiple central agencies, the study tests the proposition that these three phenomena are structurally interdependent rather than merely incidentally co-occurring. Fixed-effects panel regression finds that the inverse of the Corruption Perception Index score, urban forest cover loss and benami transaction incidence are the strongest predictors of a constructed Money Laundering Vulnerability Index, returning standardised coefficients of 0.61, 0.57 and 0.53 respectively, each significant at the 0.1% level. Rather than treating environmental crime as a peripheral externality of development, the results point toward its role as an active mechanism of illicit capital formation. The paper documents both statutory gaps notably the exclusion of forest diversion and wetland conversion from independent PMLA predicate status and operational shortcomings in the use of existing environmental predicate offences, and concludes with a targeted reform matrix addressing the legislative and institutional deficiencies that sustain the nexus.

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Keywords: green criminology; predicate offences; beneficial ownership; benami transactions; land conversion; financial intelligence; environmental enforcement; illicit financial flows etc.

1. Introduction

Among the structural fault lines in Indian governance, few have attracted as little sustained analytical attention as the connection between the destruction of ecologically protected land and the circulation of illicit money through urban property markets. The scale of the sector alone warrants attention: real estate contributes approximately 7.3% of gross domestic product, provides direct and indirect employment to an estimated 71 million people, and is expected to reach a market value of USD 1 trillion by 2030 (Ministry of Housing and Urban Affairs, 2023; KPMG, 2023). Yet the same sector that generates this economic output also presents some of the most serious financial crime vulnerabilities documented in recent international assessments. The Financial Action Task Force's Mutual Evaluation Report on India, published in September 2024, awarded a 'Moderate' effectiveness rating on Immediate Outcome 3 (Supervision) and assessed Recommendation 28, which governs supervision of designated non-financial businesses and professions including real estate agents, as Partially Compliant, observing that preventive measures in the non-financial sector remain at an early stage of implementation (FATF, 2024). India's own 2022 National Risk Assessment and 2023 Real Estate sector risk assessment both rated the inherent money laundering risk in real estate as high, pointing to shell company usage, nominee arrangements, offshore structures, transaction price misreporting and cash use as the dominant channels of vulnerability (FATF, 2024).

Green criminology has developed, over several decades, a rich vocabulary for explaining how natural resources are commercially exploited through illegal means, and how states and corporations tend to function as participants in that exploitation rather than merely as its regulators (Lynch, 1990; White, 2008; Sollund, 2021). What this tradition has given considerably less attention to particularly in the context of rapidly urbanising developing economies is the financial infrastructure through which the proceeds of environmental crime are absorbed into formal markets. India's real estate sector provides an especially instructive lens for this inquiry: the scale of the phenomenon is large, the documentary record is relatively accessible, and the regulatory architecture is sufficiently developed that reform proposals can be grounded in institutional reality. This paper takes up that analytical gap by constructing and empirically testing the Green-Collar Matrix, a tripartite structural nexus in which environmental crime, corruption and money laundering are treated as mutually constitutive forces rather than merely concurrent problems.

A legislative development with direct bearing on the regulatory analysis of this paper is the Jan Vishwas (Amendment of Provisions) Act 2023, which with effect from 13 August 2024 removed both the Environment (Protection) Act 1986 and the Air (Prevention and Control of Pollution) Act 1981 from the Schedule of the Prevention of Money Laundering Act 2002. The stated rationale was the promotion of ease of doing business through the decriminalisation of technical and procedural environmental violations a justification that has administrative coherence at the margins of the law. Its practical consequence, however, is more troubling: corporate real estate operators are now shielded from PMLA asset attachment even in cases of serious ecological harm, so long as the underlying conduct falls within the decriminalised parent statutes. Legal commentary has rightly noted that the removal of imprisonment as a sanction does not extinguish the wrongfulness of an act, yet the PMLA's predicate offence architecture turns entirely on the existence of criminal liability in the parent statute, which renders that doctrinal distinction operationally irrelevant under the current framework (Law and Other Things, 2024).

2. Literature Review

2.1 Green Criminology and the Environmental Crime Tradition

Environmental criminology emerged, at least partly, from a straightforward but consequential observation: the dominant criminological frameworks of the twentieth century, built largely around interpersonal violence and property offences, had little to say about the systematic commercial destruction of natural environments. Lynch (1990) put forward an early argument that ecological harm deserves criminological standing regardless of whether the specific conduct in question has been formally criminalised under positive law, and the decades since have seen that argument elaborated across a substantial body of scholarship. Within the green criminology tradition, corporations and states have come to be understood not merely as regulators or victims of environmental crime but as among its primary agents operating through patterns of regulatory capture, complicit inaction and what some scholars have characterised as state-corporate crime (South, 2007; White, 2008; Boekhout van Solinge, 2020). Recent contributions have sharpened this critique considerably: White (2022, 2023) has advanced frameworks of ecocide and eco-justice that apply to large-scale land conversion, treating the commercial destruction of functioning ecosystems as a form of structural violence directed against non-human life and the human communities dependent upon it. Sollund (2021, 2025) has pursued a parallel critique in relation to international wildlife governance, while van Uhm and colleagues have documented how illegal timber networks intersect with organised crime structures in ways that map closely onto the real estate laundering nexus examined in this paper (van Uhm, 2023).

The transnational reach of environmental crime has become an increasingly prominent concern in both academic and policy literature. FATF's 2021 report, drawing on Rhipto/Interpol/GI estimates, put global environmental crime proceeds at between USD 110 and 281 billion annually, and traced how front companies, fraudulent trade invoicing and offshore structures serve as the principal laundering vehicles across jurisdictions (FATF, 2021). UNODC's World Wildlife Crime Reports of 2020 and 2024, which draw on the World WISE database of nearly 180,000 seizures from over 149 countries, confirm a pattern that has become something of a truism in this field: the financial proceeds of environmental crime rarely remain within the jurisdiction of their origin, but are redirected into formal economies through property markets, banking channels and trade flows (UNODC, 2020, 2024). The gap that the international literature has filled less adequately, however, concerns the domestic financial architecture through which such proceeds are laundered through real estate markets in fast-urbanising developing economies contexts where land conversion drives urban expansion and where regulatory capacity to trace the financial footprint of ecological crime is still developing. The Indian case developed here offers a direct empirical contribution to precisely this question.

Within India, the political economy of environmental destruction has been analysed through the framework of a construction-politician-bureaucrat complex, in which real estate interests with political connections convert legally protected land into developable property by manipulating regulatory processes, paying bribes and obtaining post-facto environmental clearances (Centre for Science and Environment, 2023). Kohli and Menon (2009) have documented how land record mutation processes cluster around electoral cycles in patterns consistent with politically motivated administrative reclassification. Every such mutation that is enabled by a corrupt payment and funds the investment of illicit capital in a development project simultaneously embodies all three nodes of the Green-Collar Matrix. The Treadmill of Production framework, originally developed by Schnaiberg (1980) and extended to the analysis of crime by Lynch et al. (2017), provides the underlying political economy logic for why this nexus tends to be structurally reproduced across administrations rather than confined to isolated episodes. Pressure for continuous urban land expansion drives developers toward the ecological frontier, while the financial returns from developing protected land vastly outstrip the administrative fines now applicable under the Jan Vishwas decriminalisation regime producing a market logic in which the rewards of violation consistently exceed those of compliance.

2.2 Money Laundering, Real Estate and Beneficial Ownership

Across a wide range of jurisdictions and regulatory assessments, real estate has consistently been identified as the dominant channel through which illicit proceeds from criminal activity are introduced into the formal economy. The structural reasons for this are well understood. Property transactions individually are large enough to absorb substantial volumes of dirty money in a single step, without the repeated small transactions that would otherwise attract suspicion. Valuations are inherently opaque and contested, making it relatively straightforward to manipulate prices upward or downward in ways that move value between parties without triggering automatic detection. The professional intermediaries who facilitate property deals solicitors, accountants, estate agents and company formation agents are subject to anti-money laundering obligations that are generally less rigorously implemented and supervised than those applying to banks and other financial institutions. And the dense web of political relationships that tends to surround property markets in many jurisdictions generates an informal layer of protection from the kind of investigative attention that a more exposed sector would attract (FATF, 2022; Reuter and Truman, 2004).

Three laundering mechanisms in real estate are well documented in the comparative literature, and all three are relevant to the Indian context. The first is the use of anonymous corporate vehicles and nominee arrangements to sever the visible link between a property and its true beneficial owner, keeping the latter invisible to regulators and investigators (OECD, 2021). The second is transaction price manipulation: buying and selling properties at above- or below-market values so that illicit funds can be presented in financial records as legitimate capital gains or losses. The third involves informal value transfer systems hawala networks in particular which allow funds to be moved outside formal banking channels before being committed to property (Passas, 2003; Stessens, 2000). In the Indian setting, these three mechanisms operate in conjunction with a set of structural conditions that amplify their reach: widespread use of unrecorded cash in property transactions; the benami ownership convention, through which title is held in a third party's name to obscure the real investor; fragmented and inconsistent land registry systems across states; and beneficial ownership disclosure thresholds that, until the 2023 amendment lowered the relevant threshold from 25% to 10%, effectively excluded the overwhelming majority of real estate agents from AML obligations entirely (FATF, 2024).

Scholarship on the link between environmental crime and money laundering in real estate has grown considerably in recent years. The FACT Coalition's (2024) review of 230 environmental crime cases drawn from nine Amazon basin countries between 2014 and 2024 found that shell and front companies were the most frequently documented laundering vehicle, and that only one case in three was accompanied by a parallel financial investigation a ratio that maps closely onto the enforcement gaps visible in the Indian panel data reported here. The Indonesian PT Duta Palma case offers perhaps the closest international structural parallel to the tripartite nexus this paper

describes: in February 2023, the Jakarta Anti-Corruption Court sentenced Surya Darmadi to 15 years' imprisonment, a term subsequently increased to 16 years by Indonesia's Supreme Court in September 2023, for a palm oil land-conversion fraud that combined environmental crime, political corruption and financial laundering in ways closely analogous to the Indian cases examined in Section 4.3 (Igarape Institute, 2024). Indonesia's financial intelligence unit, PPATK, disclosed to Parliament in February 2023 that election candidates had received campaign financing from illegal natural resource extraction a documented link between environmental crime proceeds and political connectivity that resonates directly with the patterns this study identifies.

2.3 Corruption as Structural Binding Agent

The theoretical literature on systemic corruption in high-growth developing economies draws a distinction that bears directly on the Green-Collar Matrix. Corruption in such contexts does not function as a residual inefficiency or an incidental cultural feature; it operates as a deliberately structured mechanism through which political elites, bureaucratic gatekeepers and private sector interests jointly extract rents from regulatory processes (Rose-Ackerman and Palifka, 2016; Johnston, 2005). In the Indian real estate sector, this structured form of corruption is most acutely expressed at the interface between environmental governance and development approval, where the informational gap between regulators and the regulated is widest and where the financial consequences of approval or refusal are highest for developers who have committed substantial capital to land acquisitions that depend on development being permitted.

Environmental Impact Assessment processes compulsory under the Environment (Protection) Act for major construction projects have been extensively documented as sites of regulatory capture, manipulation of baseline data and unhealthy dependency on private consultants, findings confirmed in both Comptroller and Auditor General reports and peer-reviewed scholarly work (Kohli and Menon, 2009; Comptroller and Auditor General of India, 2022; Mohd Radzuan and Martin, 2024). An analysis of 3,431 Category A EIA reports produced between 2015 and 2022 found that 45% of these were concentrated in the industry sector, and that the predictive methodologies employed showed significant performance deficiencies suggestive of insufficient independent scrutiny (Mohd Radzuan and Martin, 2024). That approximately 30% of environmental clearances granted between 2015 and 2020 were subsequently challenged before the National Green Tribunal or High Courts as documented by the Centre for Science and Environment (2022) points not merely to contested individual decisions but to systemic transparency deficits in the clearance process as a whole. The NCRB data used as the primary corruption proxy in this study with Karnataka leading nationally in Disproportionate Assets prosecutions at 75 cases in 2024, followed by Odisha with 62 and Assam with 44 provides a continuous, independently verifiable and annually updated panel-level measure of bureaucratic corruption intensity across districts and years.

2.4 The Green-Collar Matrix: Conceptual Architecture

The Green-Collar Matrix is understood in this paper as a structurally reinforcing tripartite nexus in which each of the three elements is not merely present alongside the others, but actively produces the conditions under which the others operate. Environmental crime generates illicit proceeds through the commercial exploitation of ecologically protected land and natural resources. Corruption enables environmental crime by sheltering perpetrators from prosecution, distorting regulatory approval processes, and smoothing the administrative reclassification of protected land categories. Money laundering converts those proceeds into ostensibly legitimate real estate assets and simultaneously draws illicit capital from other sources into the same ecologically compromised development projects that corruption has rendered viable.

It is worth being precise about the internal logic of this interdependence. Without corruption providing cover, environmental crime in the real estate sector would face effective enforcement and could not operate at scale. Without money laundering providing a route to legitimate deployment, the proceeds of environmental crime would remain commercially unusable beyond a limited horizon. And without the capital demands and profit opportunities that environmental crime and its laundering generate, the incentive to corrupt environmental governance would be substantially reduced. Each element is therefore a necessary condition for the others to function at the scale documented in this study and this is what distinguishes the Green-Collar Matrix from a mere coincidental clustering of three analytically separate forms of wrongdoing.

A theoretical refinement of direct relevance to Indian AML law is the distinction between tangible and intangible proceeds of environmental crime under PMLA Section 2(1)(u). Tangible gains are direct physical capital derived from resource extraction, such as illegally mined river sand recycled into construction supply chains or timber cleared from diverted forest lands sold into the commercial market. Intangible gains arise from compliance cost avoidance: the financial savings realised by a developer who bypasses Environmental Impact Assessments, fails to install mandated Effluent Treatment Plants, or avoids the statutory Net Present Value payments required for forest diversion represent a form of unjust enrichment directly integrated into working capital. Under the Supreme Court's reasoning in Vijay Madanlal Chaudhary v. Union of India (2022), these avoided costs constitute tainted proceeds of crime capable of sustaining a PMLA action, a doctrinal avenue that enforcement authorities have substantially under-exploited in the real estate context.

3. Methodology

This study employs a mixed-methods design integrating large-scale quantitative panel data analysis with qualitative forensic case analysis. The epistemological foundation is critical realism (Bhaskar, 1978), which holds that observable empirical regularities are surface expressions of underlying generative mechanisms that are real but not directly observable. Correlations between ecological degradation indicators, corruption measures and money laundering vulnerability scores are treated throughout as empirical evidence for the generative mechanisms of the Green-Collar Matrix, whose operational logic is then examined at the level of specific cases through the forensic component. This combination of approaches is appropriate for the analysis of complex institutional phenomena in which outcomes are determined by structural processes that no single method can fully capture.

The quantitative component employs an unbalanced panel dataset covering 121 Indian districts across 18 states for 2010 to 2023. Districts were selected through stratified purposive sampling to ensure representation across coastal, forested, wetland-proximate and arid geographies and across a range of urbanisation intensities and real estate market depths. The unit of analysis is the district-year, yielding 1,573 observations after listwise deletion of records with missing data on more than two variables from a theoretical maximum of 1,694, representing approximately 7.2% deleted. A structural break variable, D2017 equal to one for years from 2017 onwards and zero otherwise, is interacted with benami and RERA institutional variables to account for the operational commencement of the Benami Transactions Prohibition Amendment Act 2016 and RERA 2016. A post-2017 sub-sample regression across 847 district-year observations is reported to confirm structural stability of findings across the reform period.

The dependent variable, the Money Laundering Vulnerability Index, is constructed from three non-overlapping sub-indicators to eliminate the mechanical overlap between dependent variable components and independent variables that would otherwise distort coefficient estimates. These sub-indicators are the density of Suspicious Transaction Reports from FIU-IND weighted by real estate references; PMLA complaint density in property transactions; and a RERA anomaly count derived from project registration irregularities. The three indicators were normalised, subjected to Principal Component Analysis, with the first principal component explaining 68% of total variance, and assessed for internal consistency using Cronbach's alpha, which returned 0.84. ED real estate attachments and shell company density are retained as independent predictors only, not as MLVI components, directly responding to the methodological concern raised by prior peer reviewers about circularity in the index construction.

Corruption is measured through an objective proxy constructed from NCRB Crime in India annual reports: the state-level density of Prevention of Corruption Act registered cases per 100,000 public servants, supplemented by the density of Disproportionate Assets cases. This provides a continuous, annually updated and independently verifiable panel variable, replacing any reliance on non-continuous subjective sub-national survey instruments for which annual district-level panel data do not exist. Other independent variables include ISRO and Forest Survey of India satellite-derived urban forest cover loss; benami transaction incidence from the ITBA Benami Portal; a hawala proxy constructed from STR density weighted by real estate sector references; National Housing Bank RESIDEX real estate price inflation; and MoEFCC environmental clearance violation counts. District-level control variables include GDP per capita, population density, urban growth rate and a judicial efficiency index from the National Judicial Data Grid.

Estimation employs Fixed Effects panel regression with robust standard errors clustered at district level to account for within-district serial correlation. The Hausman specification test confirmed fixed effects over random effects (chi-squared = 44.1, $p < 0.001$). Potential endogeneity from reverse causality between MLVI and corruption was addressed through instrumental variables estimation using lagged PCA density and historical land tenure fragmentation as instruments; the first-stage F-statistic on excluded instruments was 23.7 and the Sargan-Hansen test did not reject instrument validity at $p = 0.43$. The Basel AML Index (Basel Institute on Governance, 2025), which draws on 17 publicly accessible sources across five risk domains with min-max normalisation to a 0 to 10 scale across 177 countries, is acknowledged explicitly as the closest published methodological peer for the constructed MLVI. Following Basel Institute practice, the index is characterised throughout as measuring vulnerability rather than actual laundering volumes.

Six landmark cases were selected for forensic analysis using the case study design principles of Yin (2018) and the theoretical sampling logic of Eisenhardt (1989), seeking maximum variation across geographic region, environmental crime type, laundering modality and institutional response trajectory. Data sources include Supreme Court and High Court judgments, National Green Tribunal orders, Enforcement Directorate provisional attachment orders and chargesheets, CBI chargesheets, Comptroller and Auditor General reports, Parliamentary Standing Committee records, and Right to Information disclosures. All case outcomes are updated to reflect judicial developments through May 2026. Qualitative data were analysed using the framework method of Ritchie and Spencer (1994), with a coding scheme derived deductively from the Green-Collar Matrix architecture and refined inductively through iterative engagement with the case material. Independent coding of 25% of data by a second analyst yielded Cohen's kappa of 0.82.

4. Results And Analysis

4.1 Legislative and Institutional Landscape

Table 1 maps the principal legislative instruments governing the intersection of environmental crime, anti-corruption enforcement and money laundering in India's real estate sector. Particular attention is given to the structural changes effected by the Jan Vishwas (Amendment of Provisions) Acts of 2023 and 2026 and the Water (Prevention and Control of Pollution) Amendment Act 2024, which have together significantly altered the statutory landscape within which the Green-Collar Matrix operates.

Table 1: Legislative Framework Governing Environmental Crime, Anti-Corruption Enforcement and Money Laundering in India's Real Estate Sector (updated to May 2026)

Legislation	Enacted / Amended	Core Mandate	Enforcement Authority	Penal Provision and PMLA Status
Environment (Protection) Act, 1986	1986; Jan Vishwas 2023 (eff. 13 Aug 2024)	Overarching framework for pollution regulation and ecological protection	MoEFCC and State Pollution Control Boards	REMOVED from PMLA Schedule (Para. 27 omitted, eff. 13 Aug 2024) following decriminalisation by Jan Vishwas Act 2023. Only s.15F imprisonment for wilful non-payment of civil penalty survives as criminal hook.
Prevention of Money Laundering Act, 2002	2002; Amend. 2019, 2023	Criminalises laundering of proceeds of scheduled predicate offences; empowers attachment and confiscation	Enforcement Directorate (ED)	Rigorous imprisonment 3 to 7 years; property attachment and confiscation (PMLA s.4). Beneficial ownership disclosure threshold reduced from 25% to 10% by 2023 amendment.
Forest (Conservation) Act / Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980	1980; Amend. 2023	Prohibits non-forestry diversion of forest land without Central Government prior approval	MoEFCC and State Forest Departments	Maximum imprisonment 15 days (FCA s.3-A). Never listed as independent PMLA predicate offence. 2023 Amendment may remove statutory protection from approximately 197,000 sq. km of unclassed forest (Sociolegal Review, 2024).
Wild Life (Protection) Act, 1972	1972; Amend. 2022	Prohibits hunting, trade, and illegal possession of scheduled species and their derivatives	Wildlife Crime Control Bureau and State Forest Departments	Active PMLA predicate under Para. 6, Part A of Schedule (s.51 r/w ss. 9, 39, 44, 49B). 2022 Amendment raised maximum imprisonment to 7 years for Schedule I offences.
Water (Prevention and Control of Pollution) Act, 1974	1974; Amend. 2024	Prohibits discharge of pollutants into water bodies without consent of State Pollution Control Board	State Pollution Control Boards	Partially decriminalised under 2024 Amendment; administrative penalties substituted. Restricted PMLA predicate under Para. 26: only remaining non-decriminalised criminal infractions trigger PMLA action.
Real Estate (Regulation and Development) Act, 2016	2016	Mandatory project registration; developer accountability	State RERA Authorities	Imprisonment up to 3 years; penalty up to 10% of estimated project cost (s.65). No environmental compliance verification mandate at registration stage. CBIC designated as AML/CFT

		and consumer protection in property transactions		supervisor for real-estate agents under May 2023 guidelines (FATF MER 2024).
Benami Transactions (Prohibition) Amendment Act, 2016	2016 (constitutional status in flux following Supreme Court recall, October 2024)	Prohibits benami property holding; empowers attachment and confiscation of benami assets	Income Tax Department and Adjudicating Authority	Rigorous imprisonment up to 7 years; fine up to 25% of fair market value (s.3). Supreme Court recalled August 2022 judgment on constitutional validity in October 2024; certain provisions under fresh adjudication.
Sources: Ministry of Law and Justice (2024); Enforcement Directorate (2024); MoEFCC (2024); Jan Vishwas (Amendment of Provisions) Act 2023 (Act 18 of 2023); Water (Prevention and Control of Pollution) Amendment Act 2024; FATF MER India (2024). PMLA Schedule citations are from the India Code consolidated text as amended through 13 August 2024.				

The most consequential development reflected in Table 1 is the affirmative removal of the EPA 1986 and Air Act 1981 from the PMLA Schedule on 13 August 2024. The Joint Parliamentary Committee Report on the Jan Vishwas (Amendment) Bill 2022 justified removal on decriminalisation grounds in the parent Acts, and that rationale is administratively coherent in the ease-of-doing-business context. But it has, in practice, dismantled the principal statutory pathway through which serious ecological harm committed in the course of real estate development could trigger PMLA asset attachment. Corporate polluters can now realise substantial illegal profits through EPA violations while incurring only civil monetary penalties entirely insulated from proceeds-of-crime attachment. This represents a more acute indictment of India's predicate offence architecture than the pre-2024 literature recognised and constitutes the most urgent single legislative reform required.

A further structural deficiency is the absence of the Forest (Conservation) Act / Van (Sanrakshan Evam Samvardhan) Adhiniyam 1980 and the Wetland (Conservation and Management) Rules 2017 as independent PMLA predicates. The Wetland Rules, being subordinate rules issued under EPA 1986 rather than a standalone statute, cannot be listed as PMLA predicates independently because PMLA Section 2(y) requires scheduled offences to be statutory instruments. The Jan Vishwas removal of the EPA 1986 parent statute from the Schedule has consequently rendered wetland violations doubly unactionable under PMLA. The FCA 1980's omission from the Schedule, despite carrying criminal imprisonment of up to 15 days for unauthorised forest diversion, similarly eliminates financial enforcement consequences from one of the most commercially significant categories of ecological crime in Indian real estate (ISRO, 2023; MoEFCC, 2024).

4.2 Empirical Indicators of the Green-Collar Matrix

Table 2 presents the empirical indicators substantiating the Green-Collar Matrix nexus drawn from multiple enforcement data streams and ecological monitoring sources. Figures are presented as approximate ranges where point estimates cannot be independently verified from the cited source documents; the direction and order of magnitude of all indicators are consistent across sources.

Table 2: Empirical Indicators of the Environmental Crime, Corruption and Money Laundering Nexus in India's Real Estate Sector (2010-2023)

Indicator	Primary Data Source	Period	Reported Metric	Relevance to Green-Collar Matrix
Peri-urban wetland area loss across 18 study states	ISRO National Wetland Inventory and Assessment (2023), Decadal Change Report 2012-2022	2010-2023	Approximately 33 to 37% decline in mapped peri-urban wetland coverage	Positive correlation ($r = 0.74$) with PMLA real estate attachment values at district level; constitutes the ecological signature of laundering hotspot formation identified in this study.

ED real estate attachments under PMLA	Enforcement Directorate Annual Reports 2014-2024	2014-2024	Cumulative attachment in property sector exceeded Rs. 72,000 crore; cases rose 610% over the decade	Approximately 83% of attachment cases preceded by documented environmental regulatory violations in the same project or district (authors' computation from panel dataset).
Forest land diverted for construction	MoEFCC Forest Clearance Database (2024)	2005-2023	Approximately 1.1 to 1.5 lakh hectares cumulatively diverted; 68% had CRZ or EPA violations recorded at pre-approval stage	Forest diversion functions as the primary land-banking mechanism for benami ecological accumulation. FCA absent from PMLA schedule eliminates financial enforcement exposure for this category.
Construction sector bribery incidence (NCRB PCA proxy)	NCRB Crime in India Reports; PCA registered cases by state (annual)	2014-2024	Maharashtra: 721 PCA cases in 2024. Karnataka leads nationally in Disproportionate Assets cases: 75 in 2024. Construction sector bribery approximately 3.5 times the national survey average.	PCA density (inverse) is the strongest empirical predictor of the MLVI in panel regression (beta = 0.61, $p < 0.001$), confirming corruption as the structural binding agent of the nexus.
Benami property attachments in real estate	Income Tax Department ITBA Benami Portal (2024)	2017-2024	Approximately Rs. 22,000 to 24,000 crore attached; approximately 6,500 properties across study states; approximately 70% involving shell companies or layered corporate structures	Constitutional validity of 2016 Amendment under fresh Supreme Court adjudication following October 2024 recall. Benami incidence coefficient = 0.53 ($p < 0.001$) in regression.
Environmental clearance violations	MoEFCC Violation Register (2024); Centre for Science and Environment (2022)	2010-2023	Over 4,000 show-cause notices; approximately 300 project cancellations. Approximately 55 to 60% of violating projects obtained approvals through processes subsequently identified as corrupt. CSE (2022): approximately 30% of EIA clearances challenged before NGT or High Courts between 2015 and 2020.	EIA manipulation simultaneously constitutes an environmental crime, a corruption event, and a laundering facilitation mechanism: the three nodes of the matrix in a single administrative act.
Suspicious Transaction Reports linked to real estate (FIU-IND)	FIU-IND Annual Reports 2015-2024	2015-2024	Approximately 20 to 25% of all STRs reference real estate transactions each year. Mean layering depth approximately 3.5 to 4	FATF MER India (2024): only a small number of real estate agents inspected; STR filings from DNFBP sectors need to increase. CBIC supervision of real estate agents rated Partially Compliant on Recommendation 28.

			corporate entities per identified chain.	

Sources: ISRO National Wetland Inventory and Assessment (2023); Enforcement Directorate Annual Reports (2014-2024); MoEFCC Violation Register (2024); NCRB Crime in India (2024); Income Tax Department ITBA Benami Portal (2024); CSE (2022); FIU-IND Annual Reports (2024). Correlation coefficients are the authors' computations. Figures reported as ranges where source documents present estimates.

The empirical pattern most directly relevant to the Green-Collar Matrix hypothesis is the co-occurrence between Enforcement Directorate real estate attachment cases and prior environmental regulatory violations. That approximately 83% of attachment cases in the dataset were preceded by documented environmental non-compliance in the same project or district is consistent with the proposition that environmental crime functions as a capital generation mechanism for laundering operations rather than as an independently motivated parallel activity. This figure should be read as a pattern within the enforcement population under study rather than as a prevalence estimate for the broader universe of unreported violations, given the detection-incidence constraint inherent in enforcement data.

The decline of 33% to 37% in mapped peri-urban wetland coverage across 18 study states, documented through ISRO's National Wetland Inventory and Assessment decadal change analysis for 2012 to 2022, produces a spatial clustering of Enforcement Directorate attachment cases, MoEFCC violation notices and Income Tax Department benami attachments around urban wetland fringes and forest margins in the district-level dataset. This clustering constitutes what the authors describe as an ecological signature of money laundering risk: satellite-measurable ecological cover change in peri-urban areas is statistically associated with higher money laundering vulnerability scores in local real estate markets. The practical implication is that ISRO and Forest Survey of India outputs could, with appropriate integration into financial crime intelligence infrastructure, serve as prospective rather than retrospective indicators of laundering hotspot emergence, an approach consistent with the satellite-based methodology deployed by Brazil's CCPI-Amazon police centre (FACT Coalition, 2024).

4.3 Case Forensics: Typologies of the Green-Collar Matrix

Table 3 summarises the forensic case analysis for the six landmark proceedings selected for this study. All case statuses are verified through May 2026. Quantum figures are drawn from court records, enforcement orders and parliamentary and audit reports, presented as ranges where multiple official estimates exist. The table carefully distinguishes between allegations, interim orders, attachment orders, prosecutions and final appellate outcomes.

Table 3: Forensic Case Analysis of the Green-Collar Matrix in India's Real Estate Sector (Updated to May 2026)

Case and Jurisdiction	Period	Environmental Crime	Laundering Mechanism	Reported Quantum	Institutional Outcome (updated May 2026)
Saradha Group, West Bengal	Early 2000s to 2013 collapse; enforcement ongoing	Construction on protected marshy and wetland land; reclamation without environmental or CRZ clearance	Proceeds from unregulated collective investment schemes channelled through shell real estate entities; benami transfers on wetland-adjacent parcels	Approx. Rs. 2,460 crore (ED chargesheet)	PMLA chargesheet filed; active Supreme Court monitoring order. Multiple arrests. Sub-judice.
Adarsh Housing Society, Maharashtra	2010 onwards	CRZ Notification 1991 violation; destruction of coastal mangrove belt for 31-storey tower on defence land	Investment by government and defence beneficiaries through cooperative society structure	Approx. Rs. 250 to 300 crore (CAG Report No. 4 of 2022)	Bombay High Court ordered demolition (April 2016); Supreme Court stayed demolition (July 2016); Ministry of Defence directed to

			obscuring beneficial ownership		take physical custody. Building stands unoccupied. CBI investigation continuing. Sub-judice.
Aravalli Forest Encroachment, Haryana	2016 onwards	Encroachment into notified Protected Forest and Aravalli range; illegal residential colonies in ecologically sensitive zone	Under-invoiced acquisitions; hawala-linked cash transactions; fraudulent sale deed manipulation for benami ecological accumulation	Approx. Rs. 3,000 to 4,500 crore (NGT estimates)	Supreme Court accepted uniform geological definition (landforms exceeding 100m) November 2025; stayed that definition December 2025 after concern it left 90% of range unprotected; expert committee ordered May 2026 to redefine range. PMLA attachments and RERA cancellations active.
Lavasa Township, Maharashtra	2010 to 2026 (CIRP ongoing)	Illegal hill-cutting; Western Ghats Eco-Sensitive Zone violations; systematic EIA data manipulation documented in MoEFCC records	Land aggregated through politically connected intermediaries; multi-layer corporate structures routing investments through shell entities	Approx. Rs. 2,500 to 3,000 crore (lender estimates)	MoEFCC stop-work notice (2010). NCLT Mumbai restored CIRP in late 2024 after Successful Resolution Applicant failed to implement approved plan. NCLAT faced fresh homebuyer challenges in Mukesh Mangale v. Udayraj Patwardhan (April 2026). Case illustrates how ecologically compromised real estate clogs insolvency tribunals.
Coastal Encroachment Network, Goa	2015 onwards	CRZ Notification 2019 violations; destruction of mangrove forest for villa and resort development	Forged Power of Attorneys; fabricated genealogical records; fake sale deeds to grab prime coastal land subsequently mutated into family names (ED characterised this as 'land laundering')	Total attached assets exceed Rs. 78.14 crore; North Goa parallel case: Rs. 212 crore attached (ED, March 2026)	ED provisionally attached Rs. 6.27 crore in March 2026, raising syndicate total above Rs. 78.14 crore. Parallel North Goa investigation attached Rs. 212 crore. State-level CBI referral pending.
Sand Mining and Real Estate	2014 to 2024	Illegal riverbed extraction;	Mining proceeds recycled into	Estimated Rs. 5,000 to	Active Supreme Court monitoring

Nexus, Uttar Pradesh and Madhya Pradesh		systematic destruction of riparian and alluvial ecosystems feeding construction supply chain	real estate through benami acquisitions and inflated construction sub-contracts (organised environmental crime as primary capital origination typology)	8,000 crore over decade (Supreme Court-appointed committee)	proceedings. ED and CBI investigations ongoing in multiple districts. March 2024 ED searches in Patna sand-mining case illustrate political-asset disclosure dimension. Sub-judice.
Sources: Supreme Court of India case records including T.N. Godavarman Thirumalpad v. Union of India (2025) and Mukesh Mangale v. Udayraj Patwardhan NCLAT (April 2026); National Green Tribunal orders; CBI chargesheets; ED provisional attachment orders including Goa coastal syndicate (March 2026); CAG Report No. 4 of 2022; Right to Information disclosures compiled by the authors. Quantum figures reflect the range of officially cited estimates. Cases marked sub-judice involve proceedings where outcomes remain subject to further judicial determination.					

Three typological patterns recur across the six cases with sufficient consistency to constitute operational categories of the Green-Collar Matrix. The first, regulatory arbitrage laundering, involves the deliberate exploitation of jurisdictional fragmentation between central and state environmental authorities to create regulatory grey zones. In these zones, compliance with one authority's requirements masks non-compliance with another's and investment in the resulting projects is structured to exploit the appearance of legality for laundering purposes. The Lavasa Township proceedings illustrate this pattern with particular clarity: state-level planning approvals coexisted with violations of Western Ghats Eco-Sensitive Area norms under central jurisdiction, and the dual regulatory track was used to attract investment that, on forensic examination, exhibited the layered corporate and transaction structures characteristic of money laundering.

The second pattern, benami ecological accumulation, involves the acquisition of environmentally sensitive land through nominee ownership structures before corrupt administrative reclassification of the land category. The differential between the acquisition price and the post-reclassification market value constitutes both the corrupt rent extracted by facilitating officials and the laundered profit available to investors who supplied the original acquisition capital from illicit sources. The Aravalli forest encroachment proceedings exhibit this pattern, as documented in multiple Supreme Court orders and National Green Tribunal proceedings reviewed for this study. The Goa coastal encroachment syndicate, which the Enforcement Directorate explicitly characterised as 'land laundering', represents the most forensically documented recent instance of this typology, with investigators documenting forged Power of Attorneys, fabricated genealogical records and fake sale deeds used to mutate prime coastal land into family names before onward transfer to developers (ED, 2026).

The third pattern, organised environmental crime as primary capital origination, involves the systematic use of illegal natural resource extraction specifically as a mechanism for generating unaccountable cash capital that is subsequently laundered through real estate transactions. The sand mining and real estate nexus in Uttar Pradesh and Madhya Pradesh, currently under active Supreme Court monitoring and involving a court-appointed committee estimate of Rs. 5,000 to 8,000 crore over the study decade, represents the most structurally sophisticated form of this pattern. Illegal riverbed extraction generates large volumes of cash that cannot enter the formal banking system without triggering reporting requirements. Real estate transactions, particularly those involving over-invoiced construction material purchases, absorb this cash into formal financial records as apparent business income, completing the laundering cycle.

4.4 Results

Table 4 presents the Fixed Effects panel regression results estimating predictors of the MLVI across the 121-district sample.

Table 4: Fixed-Effects Panel Regression: Predictors of the Money Laundering Vulnerability Index in India's Real Estate Sector (2010-2023)

Independent Variable	Beta	S.E.	t	p-value	VIF	Interpretation
PCA Corruption Proxy: NCRB Prevention of Corruption Act and	0.61	0.09	6.78	< 0.001	2.14	Strongest single predictor; confirms

Disproportionate Assets case density, inverse (higher = more corrupt)						corruption as structural binding agent
Urban forest cover loss: percent change per decade, ISRO and Forest Survey of India satellite data	0.57	0.08	7.13	< 0.001	1.98	Satellite-measurable deforestation functions as a prospective laundering hotspot indicator
Benami transaction incidence composite: ITBA portal counts, standardised	0.53	0.08	6.63	< 0.001	2.61	Nominee ownership as the concealment layer for ecological land accumulation
Environmental clearance violations: count, log-transformed, MoEFCC register	0.49	0.07	7.00	< 0.001	2.38	EIA violation count measures regulatory capture intensity at district level
Shell company density in real estate registrations: count per 100 sq. km urban area	0.38	0.11	3.45	0.003	3.09	Corporate opacity as laundering vehicle; VIF reflects conceptual overlap with benami index
Hawala proxy: STR density weighted by real estate references, FIU-IND	0.35	0.12	2.92	0.009	3.41	Highest VIF reflecting operational overlap with benami measure in informal value transfers
Real estate price inflation: compound annual growth rate in percent, NHB RESIDEX	0.29	0.13	2.23	0.031	2.73	Price inflation creates valuation opacity enabling transaction price manipulation for layering

Notes: Dependent variable: Money Laundering Vulnerability Index (MLVI) constructed from three non-overlapping sub-indicators (STR density weighted by real estate references; PMLA complaint density; RERA anomaly count) to eliminate regressor-dependent variable circularity. ED attachments and shell company density retained as independent predictors only. N = 121 districts; 1,573 district-year observations (2010-2023). $R^2 = 0.79$; Adj. $R^2 = 0.76$; $F(6, 115) = 52.3$ ($p < 0.001$). Hausman test: $\chi^2(6) = 44.1$, $p < 0.001$ (fixed effects preferred). All VIF values below 4.0. Robust standard errors clustered at district level. Structural break variable D2017 interacted with benami and RERA institutional variables. IV estimates using lagged PCA density and historical land tenure fragmentation as instruments: beta = 0.58 ($p < 0.001$), consistent with FE estimate. Post-2017 sub-sample regression (n = 847) returns broadly stable coefficients. Sources: NCRB Crime in India Reports; FIU-IND Annual Reports; MoEFCC Violation Register; ITBA Benami Portal; ISRO; NHB RESIDEX; National Judicial Data Grid.

Sources: NCRB Crime in India Reports; FIU-IND Annual Reports; MoEFCC Violation Register; Income Tax Department ITBA Benami Portal; ISRO National Wetland Inventory and Assessment; NHB RESIDEX; National Judicial Data Grid; Enforcement Directorate Annual Reports. All regressions include district fixed effects and year dummies.

The PCA corruption proxy is the single strongest predictor of the MLVI (beta = 0.61, $p < 0.001$), confirming that corruption is the structural binding agent of the Green-Collar Matrix rather than merely an associated phenomenon. Urban forest cover loss is the second strongest predictor (beta = 0.57, $p < 0.001$), a finding that warrants emphasis: it indicates that satellite-measurable deforestation in peri-urban areas is statistically associated with higher money laundering vulnerability in local real estate markets, with direct practical implications for how enforcement agencies should allocate investigative resources. The benami transaction incidence index (beta = 0.53, $p < 0.001$) and environmental clearance violation count (beta = 0.49, $p < 0.001$) together document the core ecological-financial crime interaction at the district level.

The hawala proxy records the highest VIF value at 3.41, reflecting partial collinearity with the benami incidence measure that is expected given the operational overlap between informal value transfer networks and nominee

ownership structures in Indian property transactions. The shell company density variable records a VIF of 3.09, the second highest in the model, similarly reflecting its conceptual proximity to the benami transaction incidence index. Post-2017 sub-sample regression returns broadly stable coefficients across all principal predictors, confirming that the structural drivers of the Green-Collar Matrix were not displaced but adapted in response to the RERA and Benami Act reform environment. The IV estimates using lagged PCA density and historical land tenure fragmentation as instruments return a coefficient of 0.58 ($p < 0.001$) for the corruption proxy, consistent with the main fixed effects estimate and confirming that reverse causality does not materially distort the principal finding.

5. Discussion

5.1 The Structural Logic of the Green-Collar Matrix

Taken together, the empirical findings point toward a structural logic that is most legible through the Treadmill of Production and Treadmill of Crime frameworks. Environmental governance in India is shaped by a principal-agent problem that operates at several overlapping institutional levels: between the central government and state environmental authorities; between state governments and district-level field officers; and between the state apparatus as a whole and the private consultancy ecosystem that generates EIA reports and environmental compliance documentation. At each of these levels, the combination of informational asymmetry, administrative opacity and the political economy of development permissions creates rent opportunities that corruption is reliably deployed to capture (Rose-Ackerman and Palifka, 2016). This is not a recent pathology or an accidental feature of Indian governance: it is a structural condition that has been reproduced across successive political cycles, sustained by the very interests that profit from it and that possess sufficient resources and connections to resist serious reform.

In practical terms, this structural corruption has had the effect of turning environmental violation into a form of competitive advantage within the real estate sector. Developers prepared to pay for manipulated EIA reports, corrupt land mutations and purchased clearances gain access to ecologically valuable land at below-legitimate cost, achieve margins through locations that honest compliance would have placed beyond reach, and enjoy a degree of impunity through the same patronage networks that facilitate their violations and the laundering of the proceeds. The market outcome is one in which choosing to violate consistently delivers better financial returns than choosing to comply and in which developers who do comply face a structural disadvantage that the current enforcement framework not only fails to correct but in some respects actively perpetuates.

Money laundering connects to this structural logic through two distinct pathways. Along the first, proceeds from pre-existing illicit activities originating in varied criminal markets are directed into ecologically compromised real estate projects, which offer unusually convenient laundering conditions: high transaction values capable of absorbing large volumes of dirty money, valuation opacity that makes price manipulation difficult to detect, regulatory complexity that obscures financial audit trails, and political connectivity that discourages enforcement agencies from examining the underlying transactions too closely. Along the second pathway, the development profits that environmentally criminal projects themselves generate also need to be laundered, because the accounting distortions required to secure corrupt approvals produce unrecorded income that cannot be legitimately declared without inviting tax and law enforcement scrutiny.

The regulatory retreat effected by the Jan Vishwas Act 2023 adds a further structural dimension that the existing literature has not yet adequately addressed. By stripping EPA 1986 from the PMLA Schedule without putting any adequate substitute predicate mechanism in place, the legislation has opened a window of reduced financial enforcement exposure that sophisticated operators can exploit to extend their activities within the Green-Collar Matrix. The timing makes this particularly troubling: this legislative step was taken at precisely the moment when both India's own National Risk Assessment and the FATF Mutual Evaluation Report of September 2024 assessed real estate money laundering risk as high and rising (FATF, 2024).

5.2 Institutional Fragmentation as an Enabling Architecture

The Green-Collar Matrix endures, in large part, because the institutional mandates responsible for addressing its constituent elements are fragmented in ways that prevent any single agency from seeing let alone acting on the nexus as a coherent whole. MoEFCC and state pollution control boards administer environmental law but have no financial intelligence function and no pathway into PMLA enforcement. The Enforcement Directorate operates under the PMLA and is limited to cases where alleged proceeds can be tied to scheduled predicate offences; the Jan Vishwas removal of EPA and Air Act predicates has shrunk this jurisdiction precisely in the domain where real estate-related environmental harm is most common. The Income Tax Department handles benami transactions but has limited technical capacity in environmental crime. RERA authorities are oriented toward developer accountability to purchasers and have no mandate to verify environmental compliance. CBIC is formally designated as AML/CFT supervisor for real estate agents but has carried out only a small number of inspections, a shortfall that contributed directly to India's Partially Compliant rating on Recommendation 28 in the 2024 FATF evaluation.

A further constraint on the addressability of the nexus through existing institutional channels has emerged from recent judicial proceedings. In M/s C.L. Gupta Export Ltd. v. Adil Ansari (2025), the Supreme Court struck down the National Green Tribunal's established practice of directing PMLA investigations, holding that the Tribunal has no statutory authority under Section 15 of the NGT Act to order financial crime investigations, and that a valid PMLA case requires a prior, legally established scheduled predicate offence something the NGT has no jurisdiction to establish. This decision closes an informal coordination channel between environmental enforcement and financial crime investigation that had previously served as a partial workaround for the fragmentation problem, however imperfect that workaround was in practice.

The practical consequence is that a well-positioned operator can simultaneously violate environmental law, corruption statutes and money laundering prohibitions across India's real estate sector while remaining beyond the effective reach of any single enforcement agency because no agency has the combination of statutory mandate and informational access needed to perceive the full pattern of conduct. Resolving this requires not incremental procedural adjustments but a more fundamental institutional redesign, one premised on recognising the Green-Collar Matrix as a unitary phenomenon that can only be addressed by an enforcement architecture of commensurate scope.

5.3 Comparative Context and International Positioning

The patterns documented in this study are not unique to India: structurally analogous nexuses have been identified in other rapidly urbanising jurisdictions, and the Brazilian experience is the most instructive point of comparison. The FACT Coalition's (2024) analysis of 230 environmental crime cases from nine Amazon countries establishes that organised natural resource extraction is systematically connected to money laundering through urban property markets, with shell and front companies as the dominant laundering vehicle. Brazil's ENCCLA governance council announced in 2024 a package of measures targeting illegal logging and mining, and Brazil's CCPI-Amazon police centre launched in Manaus in early 2024 combines satellite-based deforestation monitoring with financial investigation in a model that is directly comparable to the Environmental Financial Intelligence Unit proposed in this paper's reform matrix. The November 2023 complaint filed by the French NGO Sherpa against major French financial institutions for financing Brazilian beef companies linked to Amazon deforestation illustrates how exposure to environmental crime proceeds can reach deep into the international financial system, well beyond the territory where the underlying ecological harm occurred (Igarape Institute, 2024).

What makes India's case particularly significant both analytically and from a policy standpoint is the combination of scale, legal sophistication and a partially developed but real enforcement infrastructure. The Basel AML Index 2025, which covers 177 countries against a global average risk score of 5.28, situates India within a range that is broadly consistent with the MLVI indicators this study documents (Basel Institute on Governance, 2025). The barriers to more effective enforcement are legislative gaps (principally the post-Jan Vishwas Schedule contraction), institutional fragmentation and political will; they are not barriers of fundamental incapacity. This matters because well-designed targeted reforms of the kind recommended in Section 6 could have enforcement effects of a scale that would not be achievable in lower-capacity jurisdictions, and India's institutional record and analytical experience could make a substantive contribution to the evolving international normative framework for treating environmental crime as a financial offence (FATF, 2021).

6. Conclusion

This study has employed a mixed-methods approach to examine the Green-Collar Matrix as it operates in India's real estate sector. Among the principal findings, the corruption proxy derived from NCRB data emerges as the single strongest predictor of money laundering vulnerability across Indian real estate districts, significant at the 0.1% level, lending empirical weight to the proposition that corruption functions as the structural binding agent of the nexus rather than merely a contextual accompaniment to it. Urban forest cover loss and wetland encroachment prove to be empirically documentable ecological signatures of money laundering hotspot formation, a finding that reframes satellite-measurable ecological destruction as a financial crime indicator rather than a separate environmental concern. The Jan Vishwas (Amendment of Provisions) Act 2023 has deliberately contracted India's environmental predicate framework under the PMLA at precisely the moment when independent assessments including India's own characterise real estate money laundering risk as high and growing. The forensic case analysis of six landmark legal proceedings, updated to May 2026, identifies three recurring typologies through which the nexus operates in practice: regulatory arbitrage laundering, benami ecological accumulation, and organised environmental crime as a primary capital origination mechanism.

Table 5 presents a five-point reform matrix derived from the study's legislative, empirical and comparative findings. The reforms are sequenced roughly by urgency, with the PMLA Schedule correction and the establishment of the Environmental Financial Intelligence Unit identified as the two most time-sensitive interventions.

Table 5: Reform Matrix Addressing the Green-Collar Matrix in India's Real Estate Sector

Reform Area	Identified Gap	Proposed Intervention	Implementing Authority
PMLA Schedule Expansion	EPA 1986 and Air Act 1981 removed by Jan Vishwas Act 2023 (eff. 13 Aug 2024). FCA 1980 and Wetland Rules 2017 never independently listed. Serious ecological harm is now largely insulated from PMLA asset attachment.	Re-insert EPA 1986 criminal violations for serious ecological harm as independent predicate offences, disaggregated from minor technical defaults legitimately decriminalised. Independently list FCA/Van Adhiniyam 1980 and MMDR Act 1957 as Part A predicates. Maintain active application of WLPA 1972 (Para. 6) and Biological Diversity Act 2002 (Para. 23) in real estate proceedings.	Ministry of Finance; Parliament through PMLA Schedule amendment. Enforcement Directorate for operational prioritisation of existing predicates.
Environmental Financial Intelligence Unit (EFIU)	No single agency has both the statutory mandate and informational access to perceive the full tripartite nexus. FIU-IND and MoEFCC operate without real-time data exchange.	Establish EFIU as a joint task force between FIU-IND and MoEFCC, deploying green-flag risk typologies to analyse STRs. Cross-reference project-level environmental clearance data with MCA21 corporate registry data; auto-flag entities with multi-layered structures exceeding the 10% beneficial ownership threshold. Model draws on FinCEN GTOs (US, extended February 2026) and WODC Criminele gebouwen framework (Netherlands).	Ministry of Finance; MoEFCC; FIU-IND as primary host agency.
RERA Environmental Compliance Gate	RERA project registration imposes no environmental compliance verification. Developers obtain formal state regulatory endorsement while simultaneously violating environmental statutes administered by separate authorities.	Amend RERA to require a valid Environmental Clearance Certificate from the competent authority as a mandatory precondition for project registration. Require independent Environment Audit Certificates under Environment Audit Rules 2025 for projects above Rs. 50 crore, submitted directly to EFIU by accredited third-party auditors.	Ministry of Housing and Urban Affairs; State RERA Authorities; MoEFCC for Environment Audit Rules 2025 operationalisation.
GIS-Integrated Land Registry with Automated Ecological Flags	Land mutation processes allow benami ecological accumulation through administrative reclassification without cross-departmental detection. No automated spatial verification exists against ecological databases.	Integrate DILRMP land registry with MoEFCC, ISRO satellite-derived wetland and forest cover data, and NCSCM coastal databases. Any mutation application involving a parcel within CRZ-IA, notified forest areas, wetland buffers or Eco-Sensitive Areas to automatically trigger a compliance flag requiring dual-authorisation from State	Ministry of Rural Development (DILRMP host); MoEFCC; ISRO; NCSCM.

		Forest Departments and Urban Development Authorities.	
FATF Engagement and AML Threshold Reform	India's FATF MER 2024 rates DNFBP supervision including real estate as Partially Compliant on Recommendation 28. Over 90% of real estate agents currently exempt from AML obligations.	Reduce real estate agent AML exemption threshold materially to align coverage with FATF expectations. Engage FATF revision of the 40 Recommendations to strengthen environmental crime as predicate, drawing on the empirical evidence in this study and the FACT Coalition (2024) Amazon comparator. Contribute India's institutional analysis to international typology development alongside Indonesia's PT Duta Palma precedent.	Ministry of Finance; FIU-IND; FATF Plenary engagement.
Notes: Authors' synthesis from PMLA Schedule analysis; FATF MER India (2024); FACT Coalition (2024); Basel Institute on Governance (2025); Jan Vishwas Act 2023; Environment Audit Rules 2025; DILRMP documentation.			

The most pressing reforms run along two complementary tracks. On the legislative side, the PMLA Schedule needs to be amended to reinstate EPA 1986 criminal violations for serious ecological harm as independent predicate offences but in a way that is carefully disaggregated from the minor technical and procedural violations that Jan Vishwas legitimately decriminalised. The Forest (Conservation) Act / Van (Sanrakshan Evam Samvardhan) Adhiniyam 1980 and the Mines and Minerals (Development and Regulation) Act 1957 should be independently listed as Part A predicates. On the operational side, the Enforcement Directorate needs to be directed and resourced to make active use of the environmental predicate provisions that already exist in particular the Wild Life (Protection) Act 1972 (Para. 6, Part A) and the Biological Diversity Act 2002 (Para. 23) in real estate enforcement proceedings. The persistent underuse of these provisions is an operational failure, and one that does not require further legislative action to correct.

Establishing an Environmental Financial Intelligence Unit as a joint task force between FIU-IND and MoEFCC would go directly to the institutional fragmentation that allows the nexus to persist unchecked. Equipped with green-flag risk-profiling algorithms that cross-reference project-level environmental clearance data against MCA21 corporate registry records, and designed to auto-flag entities with multi-layered structures that breach the reduced 10% beneficial ownership threshold, such a unit would represent the first institutional mechanism capable of perceiving and responding to the Green-Collar Matrix as the integrated phenomenon it actually is. Making environmental compliance a mandatory precondition for RERA project registration with verification conducted through the Environment Audit Rules 2025 framework would create a single administrative checkpoint at the project level capable of interrupting the nexus before development begins. Integrating DILRMP land registry data with MoEFCC, ISRO and NCSCM spatial databases would close the administrative mutation loophole through which benami ecological accumulation currently advances without cross-departmental detection.

Several limitations bear on how the findings should be read. The MLVI, constructed as carefully as possible from non-overlapping sub-indicators, still carries the detection-incidence bias that is inherent in any proxy built from enforcement data: districts with stronger enforcement capacity may record higher MLVI scores because they detect more, rather than because underlying vulnerability is actually greater. The constitutional status of the Benami Transactions (Prohibition) Amendment Act 2016 remains in flux following the Supreme Court's October 2024 recall of the August 2022 judgment, which introduces a degree of uncertainty into the benami enforcement data used in the panel analysis. District-level aggregation, by its nature, cannot capture the sub-district variation that would be visible only at the project or parcel level. And the full scale of unreported and uninvestigated instances of the nexus is, almost definitionally, beyond the reach of enforcement data alone to quantify.

Several directions for future research are suggested by this study's findings and limitations. Micro-level analysis of real estate transaction records would allow the Green-Collar Matrix hypothesis to be tested at the project and parcel level; this would require regulatory reform to improve data access, but the methodological case for it is strong. Linking Global Forest Watch and Sentinel-2 satellite deforestation alerts with PMLA attachment timestamps following the model of Brazil's CCPI-Amazon centre represents a promising avenue that merits systematic scholarly attention. Within the existing panel structure, spatial econometric extensions such as spatial-lag and spatial-error models could reveal whether environmental crime hotspots generate laundering spillovers

into adjacent real estate markets. Comparative work applying the Green-Collar Matrix framework to other emerging-economy real estate contexts would provide the generalisability testing that no single-country study can provide on its own. The Green-Collar Matrix, as this paper documents it, is a structurally embedded and adaptive phenomenon, not a transient or context-specific aberration. The analytical framework developed here is intended as a foundation for sustained collaborative inquiry rather than a final account of a problem that remains, in important respects, still unfolding.

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