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EDITORIAL ANALYSIS

India's Highways Need a Green Policy Reset

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India's Highways Need a Green Policy Reset

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INTERVIEW ANGLE

"Should environmental clearance for linear infrastructure projects move from a per-project model to a cumulative landscape-level assessment, and what institutional reform would that require?"

EDITORIAL SUMMARY:

The Indian Express argues that India's expressway expansion under Bharatmala Pariyojana and PM Gati Shakti is outpacing its environmental safeguards. The Green Highways Policy 2015 has produced thin plantation outcomes, the environmental clearance regime evaluates projects in isolation rather than at landscape level, and EV-ready charging corridors lag construction. A policy reset must integrate biodiversity audits, mandatory wildlife corridor design, native-species afforestation and life-cycle carbon accounting into NHAI project sanctioning.

THE SCALE OF THE EXPANSION

India's National Highway (NH) network has grown faster in the past decade than at any time in its history.

INDICATOR	VALUE
National highway length (March 2024)	~1,46,000 km
Recent annual NH construction	12,000+ km/year
Bharatmala Pariyojana sanction (2017)	₹5.35 lakh crore
Bharatmala length planned	~34,800 km
Bharatmala awarded share	~2/3
Vision 2030 NH target	~2,00,000 km

The acceleration is anchored in three policy instruments — the **Bharatmala Pariyojana** (sanctioned 2017), the **PM Gati Shakti National Master Plan for Multi-modal Connectivity** (2021) integrating road, rail, port and logistics planning, and the **National Infrastructure Pipeline** providing fiscal framework continuity.

The expansion has reshaped logistics costs, freight movement, and inter-regional access. It has also created an environmental footprint whose magnitude India's safeguard architecture was not designed to absorb at this pace.

THE GREEN HIGHWAYS POLICY 2015

The **Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy 2015** was a flagship environmental initiative of the Ministry of Road Transport and Highways.

Design

- **1% of the total project cost** is to be earmarked for plantation along National Highways
- The policy aspires to plant approximately **one crore trees annually** along NH corridors
- The National Highways Authority of India (NHAI) is the implementation agency

The Implementation Gap

In practice, the policy has under-delivered:

- **Monsoon-bunched plantation drives** concentrate planting into a short window, straining seedling logistics and survival.
- **Survival rates of 30-50%** are routinely reported, well below the ecological design assumption.
- **Exotic-species choices** — chosen for fast canopy and visual effect — provide weaker carbon sequestration, lower native biodiversity support and higher pest vulnerability than indigenous species.
- **Thin agency capacity** at NHAI for post-plantation maintenance, monitoring and audit means survival data is often unreliable.

The policy is not failing because the framework is wrong; it is under-delivering because the implementation system treats plantation as a numerical accounting exercise rather than an ecological intervention.

THE CLEARANCE REGIME — PROJECT-BY-PROJECT, NOT LANDSCAPE

India's environmental clearance regime evaluates highway projects in isolation rather than as cumulative landscape interventions.

The Statutory Framework

STATUTE	FUNCTION
EIA Notification 2006 (under Environment (Protection) Act 1986)	Environmental Impact Assessment for projects above thresholds
Forest (Conservation) Act 1980	Diversion of forest land for non-forest use requires central approval
Forest (Conservation) Amendment Act 2023	Amends the 1980 Act; contested in PIL pending before the Supreme Court for diluting forest-area triggers for clearance
Wildlife (Protection) Act 1972	Section 33 prohibits diversion in protected areas without specific permissions
National Wildlife Action Plan 2017-2031	Frames protected-area conservation priorities

The Cumulative Impact Problem

A single highway segment may receive clearance because its individual impact on a protected area appears manageable. But the cumulative impact of multiple highways, railway lines, transmission corridors and pipelines — all linear infrastructure — fragments wildlife habitat in ways that no individual project assessment captures.

Wildlife corridors such as **Kanha-Pench**, **Kaziranga**, **Mukundra-Ranthambhore** and **Bandipur-Mudumalai** are landscape-scale ecological networks that span multiple states and multiple project jurisdictions. A project-level EIA cannot, by design, evaluate cumulative landscape impact.

WILDLIFE CORRIDOR PRESSURE

Linear intrusions through wildlife habitat have known ecological consequences.

- **Genetic isolation:** Populations separated by busy corridors lose genetic connectivity over generations, raising extinction risk.
- **Road kill:** Estimates by the Bombay Natural History Society (BNHS) and the Wildlife Institute of India (WII) place vertebrate road-kill mortality in the tens of thousands annually across Indian highways — covering snakes, amphibians, small mammals, birds and occasional large carnivores.
- **Behavioural disruption:** Noise, light pollution and traffic frequency alter animal movement patterns, feeding behaviour and reproductive success even where direct mortality is absent.

Judicial and Administrative Interventions

- **Bandipur-Mudumalai night traffic ban (2009):** The Supreme Court restricted night-time vehicular movement through Bandipur Tiger Reserve to reduce wildlife mortality — a precedent that has been litigated and partially extended.
- **Mitigation infrastructure:** Underpasses on the Kaziranga corridor, eco-bridges on the Pench corridor, and elevated stretches in some Western Ghats projects represent India's growing — but still patchy — adoption of corridor design.
- **State-level wildlife boards** evaluate diversions, but their consultative weight in NHAI sanctioning remains advisory rather than determinative.

THE EV CHARGING CORRIDOR LAG

India's electric mobility transition depends on charging infrastructure that follows — and ideally anticipates — highway expansion.

SCHEME	FUNCTION
FAME II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles Phase II)	Incentives for EV adoption and charging infrastructure
PM e-DRIVE (PM Electric Drive Revolution in Innovative Vehicle Enhancement)	Successor scheme expanding EV ecosystem support
NHEV (National Highways for Electric Vehicles) pilots	Demonstration corridors on Delhi-Jaipur-Agra and Delhi-Chandigarh
Bureau of Energy Efficiency (BEE) green corridor targets	Charging station targets along NH grids

Implementation has lagged construction. Long-route EV adoption remains constrained by range anxiety even on flagship corridors. Toll plazas — natural rest and recharge nodes — have not been mandated to host charging infrastructure as a default.

CLIMATE ACCOUNTING AND LIFE-CYCLE ASSESSMENT

Highway construction is carbon-intensive. **Cement and steel** — the principal embodied inputs — together account for a meaningful share of India's industrial CO_2 emissions. **Bitumen** adds petroleum-derived emissions. Earthworks, vehicle fleet emissions during construction, and post-completion induced traffic add further.

Life-Cycle Assessment (LCA) — the methodology for measuring environmental impact across construction, operation and end-of-life phases — is not yet mandated in NHAI Detailed Project Reports or bid contracts. Without LCA, project comparisons (alignment options, material choices, design alternatives) cannot incorporate climate trade-offs systematically.

Carbon credit eligibility for highway-linked plantation, EV charging and material substitution remains limited under India's domestic carbon market design.

COMPARATIVE PRACTICE

Linear infrastructure jurisdictions globally have developed structural ecological integration.

JURISDICTION	FRAMEWORK
European Union	Habitats Directive; Natura 2000 network of protected areas; mandatory landscape-level assessment
Norway	Wildlife crossings and reindeer migration corridors integrated into national highway design
Australia	Koala bridges and rope canopies over arterial roads in Queensland
United States	NEPA-based Environmental Impact Statements with cumulative impact requirement

The comparator point is not that India should adopt these frameworks wholesale but that **ecology as a structural input — not as mitigation after design — is the global direction of travel**.

WAY FORWARD

The Indian Express recommends a five-part reset:

1. **Strategic Environmental Assessment (SEA) at corridor level** under the EIA framework — assessing cumulative landscape impacts before individual project clearances.
2. **Mandatory wildlife corridor design** via Wildlife Institute of India (WII) consultation for all NH segments traversing protected areas or notified corridors — with underpasses, eco-bridges and elevated stretches as design defaults, not exceptions.
3. **Native-species afforestation** with measurable survival targets, third-party audit, and post-plantation maintenance contracts of at least five years — replacing the current accounting-based plantation model.
4. **Life-Cycle Assessment integration** into NHAI Detailed Project Reports and bid contracts, with material substitution incentives for low-carbon cement and steel.

5. **EV-ready charging infrastructure at every toll plaza by 2027** under PM e-DRIVE — making charging follow construction rather than lag it.

UPSC MAINS ANALYSIS

GS Paper 3 — Environment, Economy and Infrastructure

- Environmental statutes: EIA Notification 2006, Forest (Conservation) Act 1980, Forest (Conservation) Amendment Act 2023, Wildlife (Protection) Act 1972
- Highway development: Bharatmala Pariyojana, PM Gati Shakti, National Infrastructure Pipeline
- EV transition: FAME II, PM e-DRIVE, NHEV pilots
- Climate: Life-Cycle Assessment, embodied carbon in cement and steel
- Institutional: NHAI, Wildlife Institute of India, BNHS, Bureau of Energy Efficiency

Keywords: Green Highways Policy 2015, Bharatmala Pariyojana, PM Gati Shakti, EIA Notification 2006, Forest (Conservation) Amendment Act 2023, Wildlife (Protection) Act 1972, Bandipur night ban 2009, Kanha-Pench corridor, Wildlife Institute of India, Strategic Environmental Assessment, Life-Cycle Assessment, FAME II, PM e-DRIVE, NHEV, Habitats Directive, Natura 2000.

> *India's highway expansion is one of the most visible achievements of its infrastructure decade. Its environmental footprint is, however, accumulating faster than its safeguard architecture is being modernised. The Indian Express's underlying argument is that ecology cannot remain a compliance ritual at the end of project design; it must enter the bid contract, the Detailed Project Report, the corridor-level assessment, and the toll plaza specification. A reset is not anti-development. It is the only path on which the next 60,000 km of highways do not come at the cost of the wildlife corridors, native forests and climate budget that the first 1,46,000 km have already drawn down.*

Source: The Indian Express

KEY ARGUMENTS AT A GLANCE

India's expressway expansion under Bharatmala and PM Gati Shakti is outpacing its environmental safeguards — the Green Highways Policy 2015 is thinly implemented, wildlife corridor design is reactive, environmental clearance is routinised, life-cycle carbon accounting is absent and EV-ready charging corridors lag

construction, requiring a policy reset that integrates ecology into NHAI sanctioning rather than treating it as an end-of-pipeline add-on.

✓ SUPPORTING

- India's National Highway network reached about 1,46,000 km in March 2024, expanded by 12,000+ km annually in recent years, and the Bharatmala Pariyojana sanctioned in 2017 (about ₹5.35 lakh crore for ~34,800 km) is roughly two-thirds awarded, with Vision 2030 targeting ~2,00,000 km — an unprecedented pace of linear infrastructure construction.
- The Green Highways Policy 2015 mandates that 1% of project cost be earmarked for plantation along national highways with an ambition of about one crore trees annually, but implementation gaps — monsoon-bunched drives, low survival rates of 30-50%, thin agency capacity — have meant the policy has not produced the carbon and biodiversity benefits its design promised.
- The environmental clearance regime — EIA Notification 2006, the Forest (Conservation) Act 1980 as amended by the Forest (Conservation) Amendment Act 2023 (with PIL pending in the Supreme Court), the Wildlife (Protection) Act 1972 — assesses each highway project in isolation, missing the cumulative landscape impact on wildlife corridors such as Kanha-Pench, Kaziranga, Mukundra-Ranthambhore and Bandipur.
- EV-ready charging corridors under FAME II and the PM e-DRIVE scheme, and the National Highways for Electric Vehicles (NHEV) pilots on routes such as Delhi-Jaipur-Agra and Delhi-Chandigarh, have lagged construction; cement and steel intensity in highway projects accounts for a meaningful share of India's industrial CO2 but is not yet captured in life-cycle assessment in NHAI bid contracts.

⚠ COUNTER

Highway expansion is critical to India's growth, logistics competitiveness and regional integration; moving from project-level to landscape-level environmental assessment will lengthen clearance timelines, increase costs, and risk delays in connecting under-served regions — particularly in the North East and tribal districts — where road infrastructure remains a development bottleneck.

→ WAY FORWARD

> Adopt Strategic Environmental Assessment (SEA) at corridor level under the EIA framework; mandate wildlife corridor design via Wildlife Institute of India (WII) consultation for all highways traversing protected areas or notified corridors; replace exotic-species plantation with native-species afforestation with measurable survival targets and third-party audit; integrate Life-Cycle Assessment (LCA) of cement, steel and bitumen into NHAI Detailed Project Reports and bid contracts; mandate EV-ready charging infrastructure at every toll plaza by 2027 under PM e-DRIVE.

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✍️ MAINS ANSWER FRAMEWORK

QUESTION

"India's expressway expansion is outpacing its environmental safeguards." Examine the gaps in the Green Highways Policy 2015, the EIA Notification 2006 and the Forest (Conservation) Amendment Act 2023, and suggest a reform agenda integrating biodiversity, climate and EV-readiness into highway planning. (250 words)

INTRODUCTION

The Indian Express argues that India's expressway expansion is moving faster than its environmental safeguards can absorb, and that the Green Highways Policy 2015 must be reset to integrate biodiversity, climate and EV-readiness into NHAI sanctioning rather than treat ecology as an end-of-pipeline add-on.

BODY

India's National Highway network reached about 1,46,000 km in March 2024, having added 12,000+ km annually in recent years under the Bharatmala Pariyojana (₹5.35 lakh crore sanction in 2017 for ~34,800 km, roughly two-thirds awarded) and the PM Gati Shakti National Master Plan for Multi-modal Connectivity. Vision 2030 targets approximately 2,00,000 km of national highways with greater 4/6-laning.

The Green Highways Policy 2015 mandates a 1% project cost earmarking for roadside plantation, with an aspiration of about one crore trees planted annually along NH corridors; implementation gaps — drives bunched into monsoon, low survival rates of 30-50%, thin agency capacity, exotic species choices — have meant the carbon and biodiversity returns have been disappointing. The clearance regime — EIA Notification 2006, the Forest (Conservation) Act 1980 amended in 2023 (with a PIL pending in the

Supreme Court contesting the dilution of forest-area triggers for clearance), and Section 33 of the Wildlife (Protection) Act 1972 prohibiting diversion in protected areas — assesses projects in isolation, missing cumulative landscape impacts on wildlife corridors such as Kanha-Pench, Kaziranga, Mukundra-Ranthambhore and Bandipur-Mudumalai (the last subject to the Supreme Court's 2009 night traffic ban).

Linear intrusions cause genetic isolation of populations and road-kill mortality estimated by the Bombay Natural History Society and Wildlife Institute of India in the tens of thousands of vertebrates annually. EV-ready charging corridors under FAME II, the PM e-DRIVE scheme and the NHEV pilots on Delhi-Jaipur-Agra and Delhi-Chandigarh have lagged construction, leaving range-anxious EV adoption on long routes constrained.

Cement and steel embodied in highway projects account for a meaningful share of India's industrial CO_2 but Life-Cycle Assessment (LCA) is not yet mandated in NHAI Detailed Project Reports or bid contracts. Comparative jurisdictions — the EU's Habitats Directive and Natura 2000 network, Norway's wildlife crossings, Australia's koala bridges — show how linear infrastructure can be designed with ecology as a structural input rather than a mitigation afterthought.

CONCLUSION

A green policy reset for India's highways requires Strategic Environmental Assessment at corridor level, mandatory wildlife corridor design via WII consultation, native-species afforestation with audited survival targets, Life-Cycle Assessment integration into bid contracts, and EV-ready charging at every toll plaza by 2027 — converting the Green Highways Policy from a plantation accounting exercise into a structural integration of biodiversity, climate and clean mobility into NHAI sanctioning.

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