DAILY CURRENT AFFAIRS

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Topics Covered

A conservation manual, drafted by the ordinary citizen

GS Paper I (Indian Heritage & Culture)
GS Paper II (Governance & Polity) Essay & Ethics Paper
Themes of *cultural identity, continuity, heritage as a public good, intergenerational equity, citizen responsibility.*

A conservation manual, drafted by the ordinary citizen

In his Independence Day addresses delivered from the Red Fort, Prime Minister Narendra Modi has been exhorting fellow citizens to preserve the memory of those who overthrew colonial rule. Even as his reminders have been timely, his tactics – enumerating a few freedom fighters' names and including some of their words in his speeches – are as well-worn as the Archaeological Survey of India's (ASI) approach to conserving the nation's built heritage. With a few exceptions, the ASI has largely been content with selecting monuments, isolating them, repairing them and occasionally polishing them. Given the enormity and complexity of India's past and the risk of large sections of it fading from our collective consciousness, it is time to articulate a more thoughtful and holistic approach to the conservation of ASI monuments.

Acknowledging that the current frameworks informing conservation are the result of certain historical circumstances is important. Driven by a conviction that edifices, if properly analysed, can unlock histories of communities and thus allow for governing them more effectively, colonial officers located and catalogued pillars, rock-cut caves, *stupas*, temples, mosques, citadels, water reservoirs, and other edifices, promulgated historical preservation laws, and prescribed procedures for maintaining their structural integrity. John Marshall's *Conservation Manual* (1923) advocated extensive repair of ancient monuments and reshaping their immediate surroundings into gardens.

Marshall's handbook continues to inflect the preservation of about 3,600 ASI sites, along with new laws, amendments, and provisions of international agreements. Notwithstanding these efforts, field surveys, audit reports, and court rulings establish that many protected monuments are falling apart. Recommendations of a conservation policy enunciated in 2014 are being irregularly followed. Not surprisingly, the government has begun to invite corporations to adopt monuments.

A road map for conserving monuments

Studying the writings of modern India builders is one way to begin articulating a new approach to conserving monuments. Consider lessons provided by Sarvodaya, Mahatma Gandhi's transcreation of a collection of essays by John Ruskin, a Victorian art critic. His rendering accentuated the art critic's advocacy of improving the social condition of all individuals irrespective of their backgrounds, discussed the importance of all vocations, and endorsed his admiration of craftspersons and their labour, even as it critiqued Ruskin's valorisation of Britain's imperial ambitions. Might the lessons that Gandhi learned and promoted inspire the ASI's new conservation manual to propose the following: when an edifice is conserved not only is its structural fabric to be tended, but the lives of all those who live around it and visit it are to be improved; and interpretive materials at an edifice should enable visitors to appreciate its builders' sophistication, inventiveness, and resilience.

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There needs to be a more thoughtful and holistic approach to the conservation of the Archaeological Survey of India's monuments

Conservation is a shared concern of contemporary practitioners of diverse disciplines including translators, health-care professionals, wildlife biologists, mycologists, and economists. By convening dialogues among and between these experts at various venues, listening to how they comprehend terms such as repair, preservation, and restoration and observing how audiences respond to them, the ASI can identify more principles of their new conservation manual.

Translators today are attentive to the style and mood that the authors of source texts have sought to nurture and are grasping how sentences are formed and meanings generated in unalike languages. They are recognising that connotations change over time. Thus, their outputs are intricate works in dialogical relationships with assorted pasts, and not obsequious reproductions of texts initially written in other languages. Can such viewpoints inspire the ASI conservation manual to recommend that archaeologists acknowledge their distance between the deep past and contemporary moment and make their physical interventions of a monument's fabric clearer for visitors to discern? Contemporary translators sophisticated thinking of a particular language aptness to render anew a certain text may also be used to inform a clause in the new manual: that periodic reviews be undertaken of the aptness of preservation materials to ensure that they do not harm historical fabrics.

Varied perspectives are important

Humans preserve themselves by saving memories. Listening to divergent perspectives allows memories to be exercised and sustains their propagation. Such insights should inspire the ASI to study how visitors are using protected monuments today and craft conservation principles thereafter. One way to do so would be to offer visitors opportunities to participate in open-ended conversations about their experiences.

Wildlife biologists are also thinking about protection. They reason that supporting a range of interactions occurring among and between sundry biotic and abiotic elements in an ecosystem and exchanges between networks are more efficacious strategies for restoring waning populations than safeguarding individual animals. Following this line of reasoning, might the ASI conservation manual recommend that archaeologists pay more attention to linkages between monuments and water bodies, fields, deserts, forests and settlements around them and deliberate whether certain boundary walls may be dismantled.

Mycologists have found that fungi are far from unsettling sights. Fungi are powerful agents that break down organic matter, form mutually beneficial relationships with plants including helping them access nutrients, cause diseases in humans but also provide medicines, and help produce food. Such discernments can stimulate the ASI's manual to encourage the conservation of thousands of small, half-forgotten ancient monuments strewn across the country. Old city walls, cisterns, cenotaphs and dovecotes can have multiple benefits for communities living around them including securing neighbourhoods, recharging ground water aquifers, bringing visitors who might boost local economies, providing habitats and creating public spaces.

Finally, contemporary economists' findings may also be generative. They have shown that value is produced by how things work and not just by their appearance. Following this dictum, the conservation manual may propose that it is more important for archaeologists to restore a *haveli's* natural ventilation systems than to regularly repaint its façade. Emphasising a particular resource's scarcity is another way in which value is created. Thus, further research should be undertaken to advance our knowledge of what makes ASI monuments sites of national significance. The new knowledge be used to justify larger budgets for their protection. The economic concept of creative destruction as an impetus for growth may also be utilised. For example, it can guide the transformation of old temples submerged in the reservoirs of large dams into laboratories for developing and testing technologies to document underwater sites and forge innovative alliances between historians, geologists and marine biologists.

The citizen's role

In a country as diverse as ours, conservation's meaning and value are always going to be positional and contested. Thus, all of us as ordinary citizens can help shape a new conservation manual by becoming more aware of our own locations and actions. We can also assist by further educating ourselves. Learning to read the language of the stones that monuments are built of, will allow us to listen to stories they tell and amplify largely silenced voices. We will also be able to glean builders' biases and use monuments as mirrors to confront our prejudices. Ultimately acquiring such literacy will empower us to discover India as a monument without walls and preserve ourselves as we shape a new future.

Key points from article

Current ASI Approach & Challenges

- ASI manages ~3,600 protected sites.
- Approach largely based on **John Marshall's 1923 Conservation Manual:** isolating, repairing, and polishing monuments.
- 2014 Conservation Policy recommendations irregularly followed.
- Audit reports & court rulings highlight deterioration of many monuments.
- Govt increasingly inviting **corporations (Adopt a Monument scheme)** for support.

Need for a New Conservation Manual

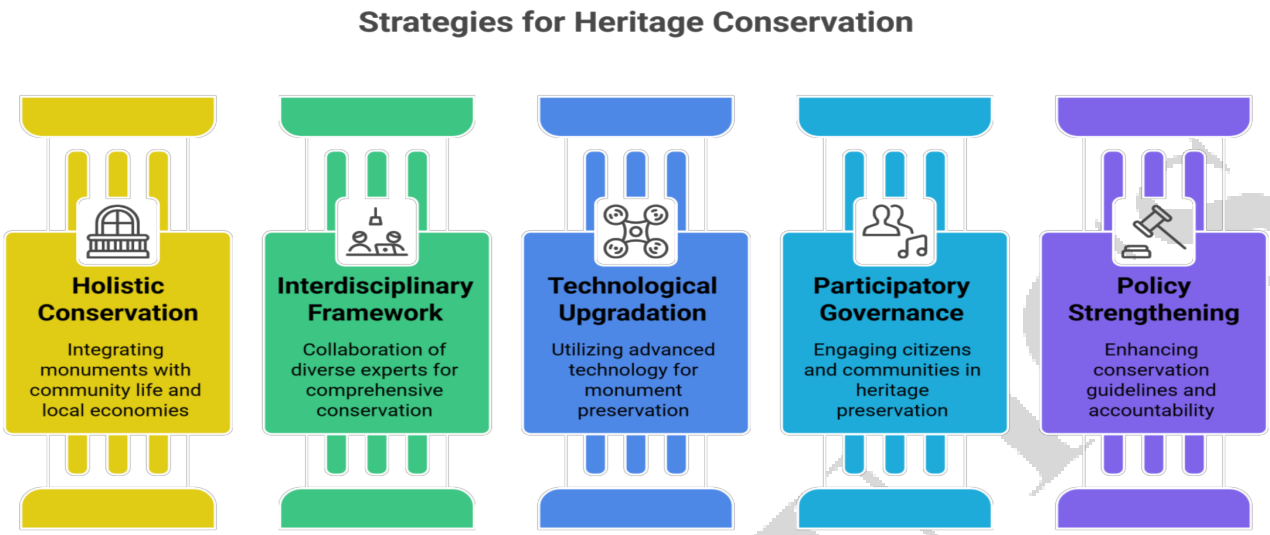
- **Inspired by Gandhian principles (Sarvodaya):**
  - Conservation should not just preserve structures but also **uplift local communities** around monuments.
  - Interpretive material should help visitors appreciate **builders' resilience, creativity & sophistication.**

Interdisciplinary Lessons for Conservation

- **Translators' perspective:**
  - Meanings change over time → conservation should acknowledge temporal distance.
  - Periodic reviews of preservation materials to avoid harming monuments.
- **Wildlife Biologists' perspective:**
  - Focus on **ecosystem linkages** (monuments with water bodies, forests, settlements).
  - Reconsider boundary walls → integrate monuments with surrounding landscapes.
- **Mycologists' perspective:**
  - Old & small forgotten monuments (cisterns, dovecotes, city walls) provide community **benefits:** groundwater recharge, tourism, public spaces.
- **Economists' perspective:**
  - Value lies in **functionality, not just appearance** (e.g., natural ventilation over repainting).
  - **Concept of scarcity** → justify larger budgets.
  - **Creative destruction** → repurposing submerged or neglected structures into research labs/ innovation sites.

Citizen's Role in Conservation

- Ordinary citizens must become **stakeholders** by:
  - Learning the "language of stones" and histories.
  - Using monuments as **mirrors for societal introspection.**
  - Promoting India as a ***"monument without walls"*** where conservation becomes a cultural ethic, not just an administrative task.



GS Paper II – International Relations
GS Paper III – Economy & Technology
Sub-part: Inclusive growth, technological missions, energy security.

In Namibia, India shows a new way to engage Africa

In his address to Namibia's National Assembly in July this year, Prime Minister Narendra Modi quoted a Namibian poet, invoked the symbolism of the *Welwitschia mirabilis* plant (the national plant) and the Springbok, and sprinkled his remarks with phrases in Oshiwambo, earning laughter and applause.

The gesture suggested a deliberate effort to engage with culturally meaningful terms, reflecting a more grounded approach to partnership-building. It is a sharp contrast to western engagement, which continues to be shaped by conditional aid, travel bans, and episodic withdrawals such as the recent USAID cutback, and is increasingly tied to migration deterrence, with assistance hinging on controlling outward migrant flows.

The steps being pursued

India is pursuing a quieter, adaptive approach, favouring alignment over instruction and forming issue-based coalitions. Underlying this appears to be a deliberate three-step logic: evoking shared historical solidarities, engaging in present-day pragmatic cooperation, and investing in long-term, future-oriented ties. This offers insights into what more thoughtful, durable partnerships with African states might look like.

The first step anchors diplomacy in a shared anti-colonial heritage, drawing on historical memory not as nostalgia, but as a legitimate force of solidarity. There are gentle but meaningful reminders: that New Delhi hosted the South West Africa People's Organization's first-ever diplomatic office during Namibia's liberation struggle; that Lieutenant General Diwan Prem Chand, an Indian officer, commanded the United Nations peacekeeping forces during Namibia's delicate transition to independence. These references are not incidental. They create a sense of long-haul engagement, contrasting with the episodic presence of many other powers.

Second is to highlight the depth and the breadth of current cooperation. New Delhi's bilateral trade with Windhoek is $800 million, modest but growing, and supported by a $12 billion development partnership across Africa. More significant are India's targeted investments in capacity-building, including the India-Namibia Centre of Excellence in IT at the Namibia University of Science and Technology, and the 'India Wing' at the University of Namibia's Ongwediva campus, funded by a $12 million grant. These efforts leverage India's strengths in IT and respond to Namibia's youthful population and digital readiness.

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New Delhi is quietly reshaping its Africa engagement, with smart and issue-based partnerships

Third, and closely linked, India is laying out a road map for the future by pivoting toward knowledge-based cooperation. Namibia's recent adoption of India's Unified Payments Interface (UPI), the first country in Africa to implement this, signals a quiet revolution in tech diplomacy. If this succeeds, it will offer a model for transferring not just digital tools but also regulatory frameworks, institutional design, and user-centric tech architectures that India has stress-tested at scale.

Advantage Namibia

Crucial to this approach is the choice of partner. Namibia's political stability, rich mineral resources and growing technological base offer a strong foundation for India's engagement, grounded in shared histories and aligned futures. President Netumbo Nandi-Ndaitwah's call to reform global economic and financial systems for fairness and resilience echoes India's own vision for inclusive, equitable governance. More than a bilateral partner, Namibia is a key collaborator in the Global South's broader effort to reshape international rules in line with their collective aspirations, agency, and demand for a more just world order.

While India and Namibia share a compelling vision for partnership, consistent follow-through remains a challenge. India's developmental ambitions are often criticised for uneven implementation, and its engagement with Africa has seen long lapses, evident in the recent visit to Namibia by an Indian head of government, the first in nearly three decades.

Though symbolically important, the visit's outcomes were modest: two memoranda of understanding on entrepreneurship and health, and Namibia's accession to the Global Biofuels Alliance and the Coalition for Disaster Resilient Infrastructure. These are valuable steps but fall short of the scale the moment, and the bilateral potential, clearly calls for.

Notably absent was any major agreement on Namibia's critical mineral reserves. As a leading uranium producer, Namibia is a natural partner for countries such as India seeking resilient low-carbon supply chains. The visit offered a clear opportunity to outline a strategic framework, including resource access, local workforce development, or investment in value addition. Though the issue was acknowledged, discussions ultimately failed to produce concrete outcomes.

Regardless, India's approach, while not without its gaps, stands out not just for what it offers but also how it engages. India's quiet recalibration emphasises trust built through inclusive dialogue, acknowledging histories, and letting African priorities shape the agenda.

Move beyond symbolism

The upcoming India-Africa Forum Summit, anticipated in the near term, could serve as a vital platform to formalise and solidify these diplomatic efforts through institutional cooperation. It presents an opportunity for India to build on recent momentum and demonstrate that its commitment to partnership and mutual respect is backed by enduring political resolve.

Delivering on this vision, however, will require more than symbolism. It will entail confronting structural and operational shortcomings at home and ensuring that India's strategic ambitions are matched by sustained investment and institutional coherence. Ultimately, India's credibility as a Global South partner will rest not only on what it commits to but also on how consistently and collaboratively it follows through.

The views expressed are personal

Key points from article

India's Cultural Diplomacy in Namibia

- PM Modi's July 2025 address included Namibian cultural references (Welwitschia plant, Springbok, Oshiwambo language).
- Aimed at **building trust through cultural sensitivity,** contrasting Western transactional/conditional aid approaches.

Three-Step Logic of India's Africa Engagement

- **Shared Historical Solidarities**
  - India supported SWAPO's liberation struggle.
  - Indian Lt. Gen. Prem Chand led UN peacekeeping during Namibia's independence transition.
  - Reinforces India's **long-term, anti-colonial solidarity.**
- **Present-Day Cooperation**
  - Bilateral trade: ~$800 million (growing).
  - Across Africa: $12 billion development partnership.
  - Targeted investments:
  - India-Namibia Centre of Excellence in IT (Namibia University of Science & Tech).
  - "India Wing" at University of Namibia (funded by $12 million grant).
- Focus: **capacity building, youth, digital readiness.**

Future-Oriented Ties

- Namibia adopts India's **UPI** (first in Africa).
- Potential model for exporting not just tech tools but regulatory and **institutional frameworks.**
- Signals India's **knowledgebased tech diplomacy.**

Strategic Value of Namibia

- Politically stable, mineral-rich (notably **uranium reserves**), growing tech base.
- Shared vision for reforming global financial & economic systems.
- Potential anchor in India's **Global South diplomacy.**

Outcomes of PM Modi's Visit

- First visit by an Indian PM to Namibia in nearly **three decades.**
- Agreements:
  - 2 MoUs (entrepreneurship & health).
  - Namibia joined **Global Biofuels Alliance & Coalition for Disaster Resilient Infrastructure (CDRI).**
- Missed opportunity: No major deal on **critical minerals/uranium,** despite India's interest in lowcarbon energy supply chains.
- **Challenges in India's Africa Policy**
  - Gaps between commitments & delivery → perception of **uneven implementation.**
  - Symbolism not always backed by sustained institutional follow-through.
  - Need for consistent, structured engagement.
- **Upcoming Opportunity**
  - **India-Africa Forum Summit** can institutionalise India's Africa engagement.
  - Must move beyond gestures → long-term **frameworks, investments, resource partnerships.**

Way Forward

- **Institutionalise Africa Engagement**
  - Regular high-level visits, strengthen **India-Africa Forum Summit** with binding roadmaps.
- **Resource Diplomacy**
  - Secure long-term agreements on critical minerals (uranium, cobalt, rare earths) with value addition in Africa, ensuring mutual benefits.
- **Tech & Capacity Partnerships**
  - Expand **Digital Public Infrastructure (UPI, Aadhaar-stack-like systems),** vocational training, and IT capacity-building.
- **Sustained Implementation & Monitoring**
  - Establish an **India-Africa Development Monitoring Mechanism** to track projects, ensure timely execution, and avoid lapses.
- **South-South Solidarity & Global Governance**
  - Leverage African partnerships to push for reforms in **UNSC, WTO, IMF**, amplifying Global South voice for a fairer world order.

India's patent landscape: universities as changemakers

GS Paper III – Science & Technology
Sub-part: Indigenisation of technology and developing new technology; Achievements of Indians in science & technology; Awareness in IPR.

India's patent landscape: universities as changemakers

The country is steadily moving from being merely a consumer of global technology to becoming its creator

DATA POINT

Twincle Halder
Vidhya Soundararajan

For 'Make in India' to succeed, India must "first discover, then invent, and then make," said David Gross, American theoretical physicist and co-recipient of the 2004 Nobel Prize in Physics, at the inaugural Quantum India Bengaluru Summit 2025. Investment in research and development (R&D) and the strengthening of innovation capabilities are particularly relevant, given the growing uncertainty in global trade and financial flows.

How is India faring on the innovation front? Are we moving towards producing technology of our own? Statistics from the Office of the Controller General of Patents, Designs, and Trade Marks are telling. In the early 2000s, countries such as China, the U.S., Japan, Germany, and South Korea dominated global filings, with Indian institutions accounting for less than 20% of the patents filed domestically. That picture has shifted dramatically **(Chart 1)**. For the first time in 2023, Indian-origin filings surpassed those from any single foreign country. Indian applicants accounted for 57% of all patent filings – a milestone marking India's growing role in the global intellectual property ecosystem. Even among granted patents, India's share has been rising, overtaking the U.S. as the second-largest recipient in 2021.

This transformation did not happen overnight. India is steadily moving from being merely a consumer of global technology to becoming its creator. This shift reflects the government's sustained efforts to build an innovation-friendly environment and support local inventors through initiatives such as the National Intellectual Property Rights (IPR) Policy and the Atal Innovation Mission, which have encouraged startups, students, and researchers to think big and protect their ideas. Amendments to patent rules have introduced reforms such as expedited examinations for specific groups, simplified timelines, reduced application fees by 80% for educational institutions, MSMEs, and startups, and full digitalisation of filing and communication. With continued investment in faster, more efficient patent systems, stronger inventor support, and better linkage between patents and commercial value, India's innovation story could strengthen even further over the next two decades.

Historically, mechanical and chemical engineering dominated the patent landscape. By contrast, filings in computer science rose from just 1.27% in 2000 to 26.5% in 2023, while electrical engineering grew from 8.27% to 16.41%. Physics-related patents increased from 2% to 4%, and biomedical patents jumped from 0.6% to 10% over the same period.

Nearly 80% of patents filed in the past two years are still "awaiting decision," reflecting both rising volumes and bureaucratic and legal complexities. Nonetheless, processing times have improved. In the early 2000s, patent grants could take 8-10 years; by the late 2010s and early 2020s, many were approved within 2-3 years, with some granted in the same year of filing **(Chart 2)**. This acceleration reflects the maturing of India's intellectual property infrastructure and its alignment with the government's innovation push.

Even the face of patent filers in India is changing. In 2000, about 43% of Indian patents were filed by companies. But by 2023, this share fell to under 17% **(Chart 3)**. Meanwhile, the share of filings from individuals jumped from under 10% in 2000 to around 32% by 2023. Government bodies and hospitals remained minor contributors. Educational institutions also increased their share steadily, reaching nearly 43% in recent years.

Government initiatives have helped drive this change. For example, KAPILA (Kalam Program for IP Literacy and Awareness), launched in 2020, promotes IP awareness in higher education institutions. The Atal Innovation Mission, launched in 2016 by NITI Aayog, fosters problem-solving skills and entrepreneurship within universities and research centres. Awards for outstanding patents by government and industry bodies further incentivise innovation.

Universities have also taken the lead by establishing dedicated IP cells and legal support units to assist faculty, researchers, and students with patent filing, technology transfer, and IP monetisation. For instance, IIT Madras doubled its patents granted from 156 in 2022 to 300 in 2023, while IIT Bombay led nationally in 2023-24 with 421 patents granted.

With government and universities creating an enabling environment, sustained increases in research funding are essential to maintain momentum. Foundational and technology-driven research often starts in university labs or early-stage startups – long before patenting. India's R&D expenditure currently stands at just 0.67% of GDP, far below the U.S. (3.5%) and China (2.5%). Raising this to around 2% of GDP is critical if India is to become a global knowledge leader. This investment is even more urgent in today's uncertain global trade and financial environment, as India must strive for self-sufficiency in both consumer and advanced technologies.

Finally, it is important to acknowledge the relentless efforts of professors and researchers, often working with limited resources, to expand the boundaries of knowledge. Strengthening their work through greater funding is not just support for academia; it is a strategic investment in India's long-term growth and global standing.

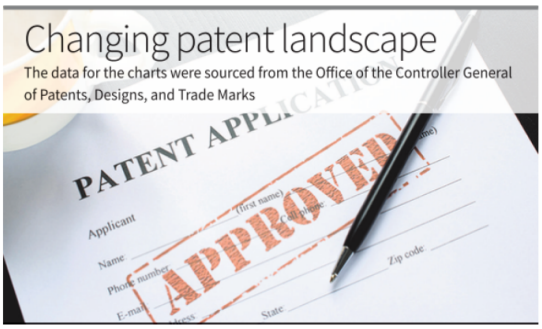


Chart 1: Country-wise share of patent filings (left axis, in %) and the total number of filings over time (right axis)

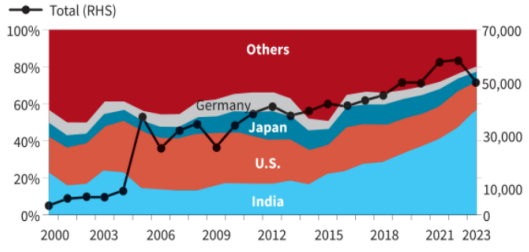


Chart 2: Average time taken to grant patents in India since 2000 (in number of years)

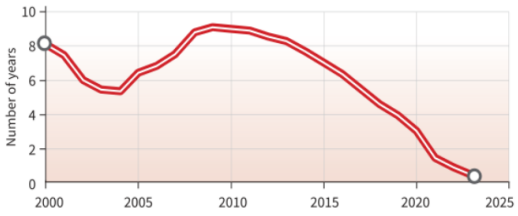
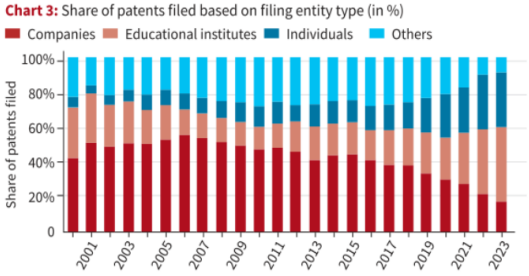


Chart 3: Share of patents filed based on filing entity type (in %)



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Key points from article

India's Transition in Innovation

- India moving from technology consumer to creator.
- 2023 milestone: Indian-origin filings (57%) surpassed foreignorigin filings for the first time.
- India overtook the U.S. as secondlargest recipient of granted patents in 2021.

India's Transition in Innovation

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Government Reforms Boosting Patents

- **National IPR Policy (2016), Atal Innovation Mission (2016)** → encouraged startups & researchers.
- **Patent rule amendments:** expedited examination, simplified timelines, 80% fee reduction for institutions/MSMEs/startups, full digitalisation.
- **KAPILA (2020):** IP awareness in higher education institutions.
- Awards for outstanding patents further incentivising innovation.

Sectoral Shifts in Patents(2000 → 2023)

- Computer Science: 1.27% → 26.5%
- Electrical Engineering: 8.27% → 16.41%
- Biomedical: 0.6% → 10%
- Physics: 2% → 4%
- Reflects diversification beyond mechanical & chemical engineering.

Filing & Granting Trends

- Patent delays reduced: From 8–10 years (2000s) → 2–3 years (2020s).
- Some patents even granted **within the same year** of filing.
- But ~80% of filings in past two years still "awaiting decision."

Changing Face of Filers

- 2000: 43% filed by companies. 2023: <17%.
- Individual share: <10% (2000) → ~32% (2023).
- Universities: nearly **43% share** of filings (2023).
- Eg: IIT Madras patents granted doubled from 156 (2022) to 300 (2023).
- IIT Bombay led nationally (421 patents in 2023-24).

Challenges

- India's **R&D expenditure only 0.67% of GDP** (vs. U.S. 3.5%, China 2.5%).
- Need to strengthen **link between patents & commercialization.**
- Professors/researchers still face **resource constraints.**

Strategic Significance

- Innovation central to **Make in India & Atmanirbhar Bharat.**
- Greater self-reliance in consumer + advanced technologies crucial amidst global trade/finance uncertainty.
- Innovation ecosystem = long-term investment in India's **global leadership.**

Way Forward

- **Increase R&D Investment**
  - Raise R&D expenditure from 0.67% → 2% of GDP to match global peers.
- **Strengthen University–Industry Linkages**
  - Scale up **technology transfer offices** and **IP monetisation units** in universities.
  - Encourage industry-funded research and joint patents.
- **Speed up Patent Processing**
  - Further expand patent examiner workforce, AIbased scrutiny, and digital case tracking.
- **Commercialisation & Start-up Ecosystem**
  - Link patents to **incubation centres, venture capital support,** and global markets.
- **Global Collaboration & South-South Cooperation**
  - Export India's **patent processing frameworks** & digital IP infrastructure to Global South partners.

What has been the impact of ethanol blending ?

GS Paper III – Environment & Economy
Sub-part: Bio-fuels; Environmental pollution; Energy security.

What has been the impact of ethanol blending?

How are petrol vehicle owners reacting to the E20 mandate? How environmentally friendly is India's dependence on sugarcane for ethanol? How has the U.S. reacted to India's booming ethanol economy? Why has the adoption of EVs in India been much slower compared to other large economies?

EXPLAINER

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The story so far:

E20 petrol, which contains 20% ethanol and is being sold by Indian oil refiners, has been much in the news lately. India has achieved its target to blend 20% ethanol per litre of fuel five years ahead of the target under the National Policy on Biofuels. Ethanol blending in India rose from just 1.5% in 2014 to 20% in 2025, backed by the government's strong fiscal incentives to the sugarcane industry. While the government says ethanol blending achieves a range of goals such as cutting greenhouse gas emissions, bolstering farmers' incomes and reducing India's oil import bill, its benefits to the environment require closer scrutiny.

How are vehicle owners reacting to this change?

Vehicles sold in India from 2023 come with E20 stickers, indicating compatibility with 20% ethanol blended petrol. Additionally, manufacturers have addressed the concerns of those who own older vehicles. Hero Motocrop says in its website, "The material composition such as rubbers, elastomers and plastic components that are directly exposed to fuel also need to be changed to E20 compatible materials."

However, according to LocalCircles, two in three petrol vehicle owners are against the E20 mandate. Only 12% of the 36,000 people surveyed across 315 districts are in favour of the switch. Critics cited a drop in mileage and increased maintenance costs. The survey urged the Union government to allow consumers to choose the type of fuel they want.

While the Centre admitted to a "marginal drop" in engine efficiency, it said this "can be further minimised through improved engine tuning and use of E20-compatible materials." Minister Hardeep Singh Puri has called the consumer angst a "vilification campaign" facilitated by "vested, economic interests". While the Union government attempts to defend its E20 policy, its own think tank, the NITI Aayog, has urged the government "to compensate the consumers for a drop in efficiency from ethanol blended fuels", by way of "tax incentives on EI0 and E20 fuel".

According to the Minister, "since 2014-15 India has already saved more than ₹1.40 lakh crore in foreign exchange through petrol substitution." But has the benefit been passed to the end consumer?

An analysis by *The Hindu* showed that Coal India Ltd, Oil & Natural Gas Corporation (ONGC), Indian Oil Corporation (IOC), Bharat Petroleum Corporation (BPCL), and Gas Authority of India Ltd collectively contributed ₹1.27 lakh crore, or 42.3% of the total ₹3 lakh crore dividends the Union government received from non-banking Public Sector Undertaking (PSUs) between 2020-21 and 2024-25. IOC and BPCL together saw a 255% rise in their dividend payouts since 2022-23 and a 65% decrease in oil prices. However, the two PSUs only passed on a 2% decrease in petrol prices to the public.

What about the impact on agriculture?

Sugarcane-based ethanol supply has grown from 40 crore litres in FY14 to nearly 670 crore litres, derived from about 9% of total sugar output, in FY24. The Union government says it has paid "over ₹1.20 lakh crore to farmers" since FY15. But how environmentally friendly is India's dependence on sugarcane for ethanol?

About 60-70 tonnes of water is required to cultivate one tonne of sugarcane. Many sugarcane growing regions in India do not receive the 1,500 to 3,000 millimetre rainfall that is necessary for the crop's optimal growth. This leads to groundwater extraction and unsustainable irrigation methods. A 2023 Central Groundwater Board report says that sugarcane growing districts in Maharashtra extract more groundwater than nearby regions. Distress among sugarcane growers in that State has been widely reported. Unsustainable agriculture practices accelerate land degradation. The Desertification and Land Degradation Atlas of India 2021 found that almost 30% of India's land is degraded. The water intensive nature of sugarcane and the impact on ground water reserves at a time of extreme weather has been absent from the discussion on ethanol-blended petrol.

The Centre, however, says it is looking to diversify ethanol supplies. The Food Corporation of India's rice allocation for ethanol jumped to a record 5.2 million metric tonnes, which is about 3.6% of output, from less than 3,000 tonnes allocated last year. Similarly, in 2024-25, over 34% of corn output was diverted for ethanol production. This diversion forced India to import about 9.7 lakh tonnes of corn during 2024-25 – a six-fold increase over the previous year's 1.37 lakh tonnes.

Despite diversification efforts, area under sugarcane cultivation this year is estimated to be 57.24 lakh hectare against 57.11 lakh hectare last season. The assured payment mechanism for sugarcane, the Fair and Remunerative Pricing, is the key reason farmers bet on the crop as a source of stable income. While this rise is marginal, an analysis by the OECD-FAO says that 22% of India's sugarcane will be used for ethanol production by 2034.

India's booming ethanol economy has also come under the gaze of the U.S. The Trump administration is pushing India to relax restrictions to its ethanol imports. The 2025 National Trade Estimate report noted India's policy as a significant "trade barrier." Import relaxation could potentially undermine years of investment and capacity building in ethanol production. The Indian Sugar Mills Association has urged the government to maintain the restrictions.

Will it affect the transition to EVs?

The Ministry of Petroleum and Natural Gas said the shift to ethanol-blended petrol "has helped India reduce carbon dioxide emissions by 700 lakh tonnes." Shifting to EVs, however, will achieve far higher rates of emissions reductions and speed up transport's decarbonisation, which is the third largest carbon emitting sector globally after energy and industry. The success of cities like Beijing in cutting air pollution is mainly due to the rapid adoption of EVs. Of course, this switch has to be backed by renewable energy rather than coal, to aid in decarbonising transport.

Adoption of EVs has been much slower in India when compared to other large economies like the U.S., the European Union and China. About 7.6% of vehicle sales in 2024 was electric. Sales of EVs have to increase by over 22% in the next five years to reach the government's own target of 30% by 2030.

Another challenge to wider EV adoption in India is its dependence on Rare Earth Elements (REE). According to the Ministry of Mines, before China's export curbs were imposed, only 2,270 tonnes of REEs and compounds of REEs were imported in 2023-24. But this relatively lower level is critical for the industry to sustain the current level of EV production. The production and processing of many REEs is geographically concentrated in China, making global supply vulnerable to several risks.

The automotive industry has also sounded alarm bells about the disruption in rare earth supply. India's largest carmaker Maruti Suzuki reduced its near-term production targets for its new EV, e-Vitara, attributing it to delays in receiving rare earth magnets. Other manufacturers too are bracing themselves for disruptions.

Crisil Ratings Senior Director Anuj Sethi has said, "The supply squeeze comes just as the auto sector is preparing for aggressive EV rollouts." The recent detente in bilateral relations with China might help the industry to address the crisis in the short term. The Union government is engaged in diplomacy with Beijing to address the rare earth supply crunch, mainly germanium.

Going forward, there is uncertainty on whether the Centre wants to push ahead with ethanol blending beyond 20%. While Minister Puri said the government will push for blending beyond 20%, the Union government in March said that there has been no decision yet.

To know more, please scan the link to watch The Hindu's video explainer newsth.live/ethanolblending

New fuel: Farmers load freshly harvested sugarcane into a tractor trolley during the harvesting season, in Karad, Maharashtra, on December 15, 2024. PTI

THE GIST

- Vehicles sold in India from 2023 come with E20 stickers, indicating compatibility with 20% ethanol blended petrol. Additionally, manufacturers have addressed the concerns of those who own older vehicles.
- The Ministry of Petroleum and Natural Gas said the shift to ethanol-blended petrol "has helped India reduce carbon dioxide emissions by 700 lakh tonnes."
- India's booming ethanol economy has also come under the gaze of the U.S. The Trump administration is pushing India to relax restrictions to its ethanol imports.

Key points from article

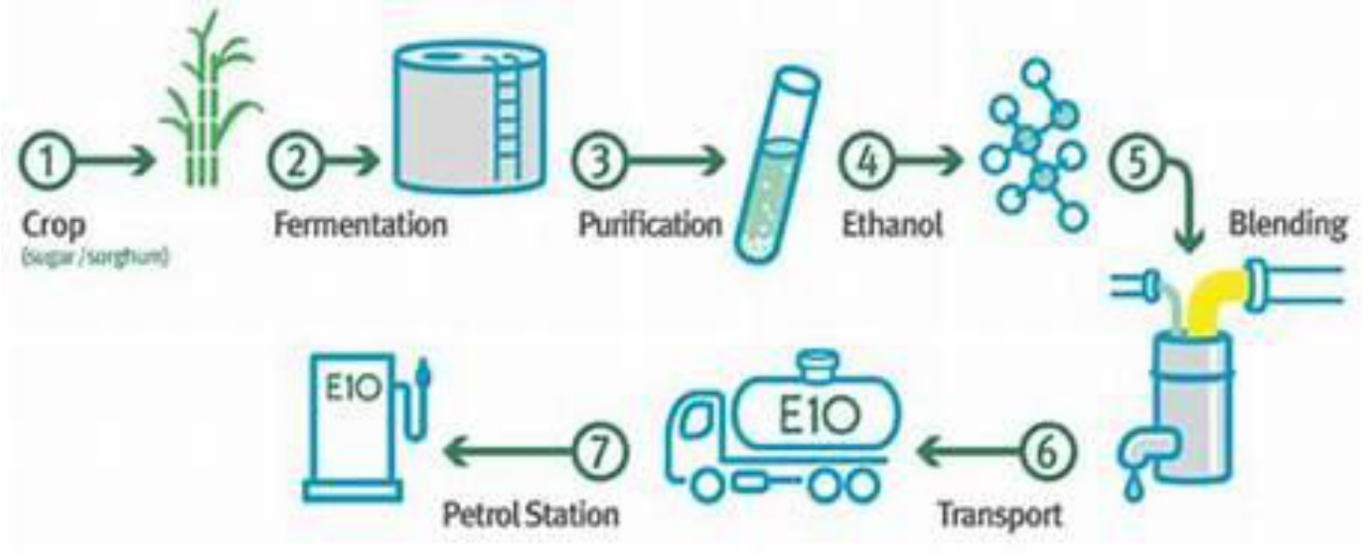
Ethanol Blending Milestone

- **E20 petrol (20% ethanol blend)** introduced nationwide (2025 target achieved 5 years early).
- Ethanol blending rose from **1.5% in 2014 → 20% in 2025.**
- Govt claims benefits:
  - Reduced oil import bill (₹1.40 lakh crore saved since 2014-15).
  - Boost to farmer incomes (₹1.20 lakh crore paid since FY15).
  - GHG reduction (~700 lakh tonnes CO_2 avoided).

Consumer Reaction

Mixed response:

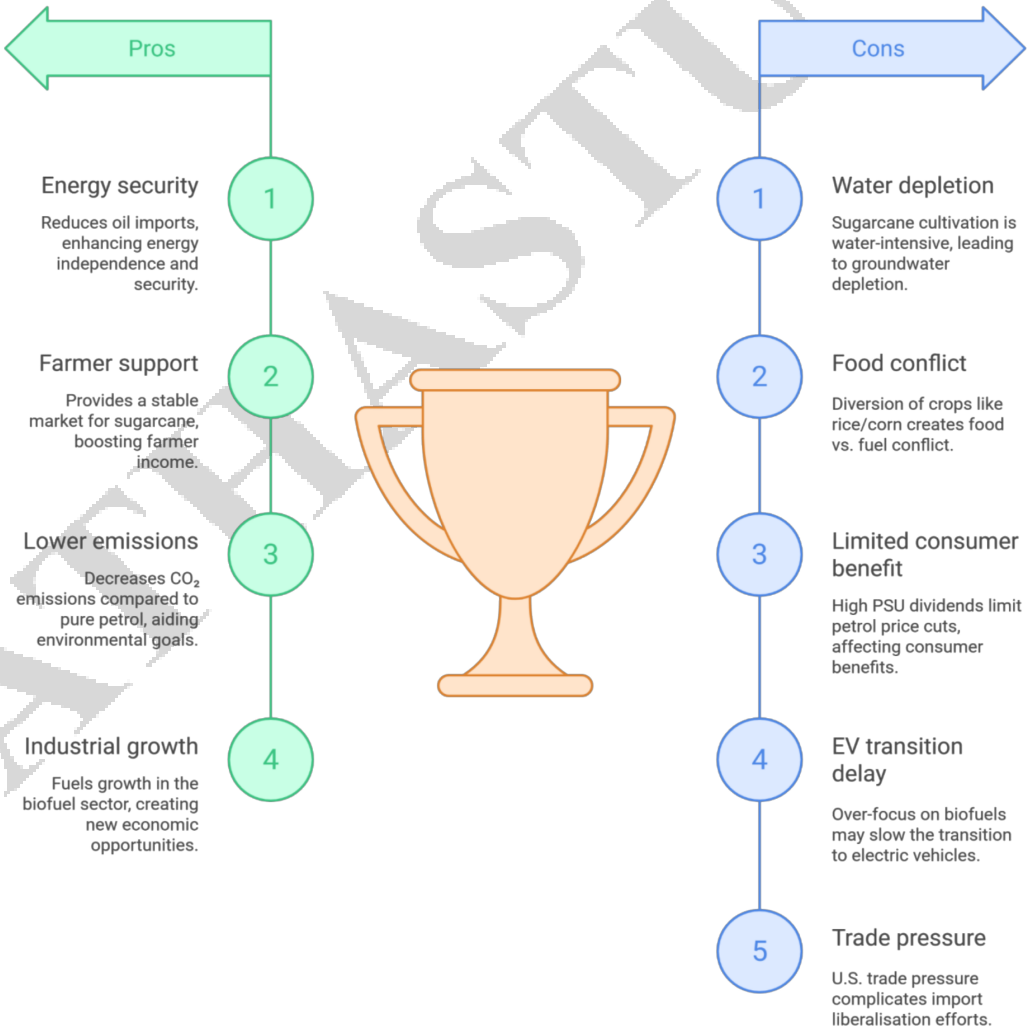
- **Resistance:** LocalCircles survey – two in three petrol vehicle owners against E20 mandate.
- Concerns: drop in mileage, higher maintenance.
- Govt: admits to "marginal efficiency drop," can be managed by tuning engines & compatible materials.
- NITI Aayog suggestion: tax incentives on E10/E20 to offset consumer costs



Agricultural Impact

- **Sugarcane dominance in ethanol supply:**
  - Production rose from **40 crore litres (2014) → 670 crore litres (2024).**
  - Uses ~9% of sugar output; by 2034, ~22% projected for ethanol.
- **Water footprint problem:**
  - 60–70 tonnes of water required per tonne of sugarcane.
  - Maharashtra's sugarcane regions show critical groundwater extraction.
  - Land degradation: ~30% of India's land already degraded (2021 Atlas).

- **Diversification attempts:**
  - Rice allocation for ethanol: record **5.2 million MT (2024).**
  - Corn diversion: 34% of output (2024-25), leading to **6× rise in imports.**
- Risk: food–fuel trade-off, unsustainable irrigation, pressure on imports.
- **Impact on EV Transition**
  - Govt: E20 blending reduces emissions, but…
  - EVs promise **far greater emission reduction** if backed by renewable energy.
  - India's EV adoption = **7.6% of vehicle sales (2024);** must reach 30% by 2030.
- **Challenges:**
  - Dependence on rare earth elements (REEs) → supply chain risk (esp. China).
  - Eg: Maruti Suzuki's e-Vitara delayed due to rare earth magnet shortages.
- EV adoption slower than U.S., EU, China.



Way Forward

- **Diversify Feedstock**
  - Use crop residues, bamboo, algae, waste-to-ethanol instead of water-intensive crops.
- **Consumer Compensation**
  - Tax rebates / subsidies for E20 fuel users.
- **Water Management**
  - Shift sugarcane cultivation to high-rainfall regions.
  - Incentivise micro-irrigation (drip).
- **Balanced Strategy**
  - Ethanol blending as bridge solution, not EV substitute.
  - Aggressively scale up EV infrastructure, RE integration.
- **Trade & Diplomacy**
  - Protect domestic ethanol producers from cheap imports.
  - Parallel push for **rare earth mineral diplomacy** to secure EV future.

UPSC PYQ 2020

Q. According to India's National Policy on Biofuels, which of the following can be used as raw materials for the production of biofuels? (2020)

1. Cassava
2. Damaged wheat grains
3. Groundnut seeds
4. Horse gram
5. Rotten potatoes
6. Sugar beet

Select the correct answer using the code given below:

(a) 1, 2, 5 and 6 only
(b) 1, 3, 4 and 6 only
(c) 2, 3, 4 and 5 only
(d) 1, 2, 3, 4, 5 and 6

UPSC PYQ 2010

Q. Given below are the names of four energy crops. Which one of them can be cultivated for ethanol? (2010)

(a) Jatropha
(b) Maize
(c) Pongamia
(d) Sunflower

Grassland invaders stifle Assam's island –like national park home to feral horses

GS Paper 3 – Environment & Ecology

Biodiversity conservation, invasive alien species, habitat loss, climate change impact, community-based conservation

Grassland invaders stifle Assam's island-like national park home to feral horses: study

Rahul Karmakar
GUWAHATI

A new study has identified at least two native plants that have joined invasive species to alter the riverine ecosystem of eastern Assam's Dibru-Saikhowa National Park (DSNP), the only habitat of feral horses in India.

These species have added to the changes in the grassland-dominated DSNP landscape, largely attributed to the recurring Brahmaputra river floods and increasing anthropogenic pressures from villages located within its boundaries, the study said.

The native "grassland invaders" are *Bombax ceiba* and *Lagerstroemia speciosa* – flowering trees known as *Simalu* and *Ajar* in Assamese. Their impact on the local vegetation has been as worrying as that of the invasive species, which include shrubs *Chromolaena odorata* and *Ageratum conyzoides*, herb *Parthenium hysterophorous* and climber *Mikania micrantha*.

Unwelcome guests: Native and invasive plant species are changing the riverine ecosystem of the national park. SPECIAL ARRANGEMENT

The study titled *Grasslands in Flux*, analysing the land use and land cover (LULC) changes in Dibru-Saikhowa from its designation as a national park in 1999 through 2024, was published in the latest issue of *Earth*, an international, peer-reviewed journal on earth science.

The researchers used remote sensing and geographic information systems to analyse the LULC changes in DSNP, an island-like formation between the Brahmaputra to the north and the Dibru river to the south.

According to their study, grasslands covered 28.78% of the 425 sq. km DSNP in 2000, followed by semi-evergreen forests (25.58%). By 2013, shrubland became the most prominent class (81.31 sq. km), and degraded forest expanded to 75.56 sq. km.

"During this period, substantial areas of grassland [29.94 sq. km], degraded forest [10.87 sq. km], semi-evergreen forest [12.33 sq. km], and bare land [10.50 sq. km] were converted to shrubland. In 2024, degraded forest further increased, covering 80.52 sq. km [23.47%]," the study said.

This change was the outcome of the conversion of 11.46 sq. km of shrubland and 27.48 sq. km of semi-evergreen forest into degraded forest, indicating a substantial and consistent decline in grassland, the study noted. Forest degradation can lead to loss of biodiversity, threaten the survival of local fauna, and reduce carbon storage, potentially intensifying climate change.

The study stated that the changes in the "natural structure and function" of the DSNP landscape pose a serious threat to the survival of grassland-obligate faunal species, many of which are already globally threatened due to ongoing habitat loss.

"The concern is heightened by the fact that numerous species are endemic to the grasslands found in the floodplains of this region. Notable species which are rapidly decreasing include the Bengal florican [*Houbaropsis bengalensis*], hog deer [*Axis porcinus*], and swamp grass babbler [*Prinia cinerascens*]," the study said.

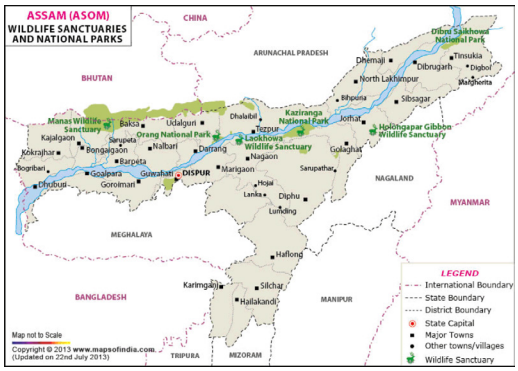
The DNSP is also home to some 200 feral horses, which are descendants of military horses abandoned during World War 2.

The study recommended a targeted grassland recovery project that would encompass the control of invasive species, improved surveillance, increased staffing, and the relocation of forest villages and support community-based conservation efforts.

Key points from article

Location & Uniqueness

- Dibru-Saikhowa NP (425 sq. km), Assam.
- Only habitat of feral horses in India (descendants of WW2 military horses).



Grassland Changes (2000–2024)

- 2000: Grasslands covered **28.78%** of DSNP.
- 2013: Shrubland expanded to **81.31 sq. km;** degraded forest to 75.56 sq. km.
- 2024: Degraded forest further increased to **80.52 sq. km (23.47%).**
- Grasslands consistently shrinking due to floods + human pressures.

Dibru–Saikhowa National Park (DSNP):

- Location: Situated in **Dibrugarh and Tinsukia districts,** Assam.
- **Biosphere Reserve Status:** Declared a Biosphere
- **Reserve in July 1997,** covering **765 sq. km.**
- **Boundaries:**
  - **North:** Brahmaputra and Lohit rivers
  - **South:** Dibru river
- **Vegetation Types:**
  - Moist mixed **semi-evergreen forests**
  - Moist mixed **deciduous forests**
  - **Canebrakes**
  - **Grasslands**
- **Unique Feature:** Largest Salix (willow) swamp forest in North-East India.
- **Climate: Tropical monsoon** – hot, wet summers and cool, usually dry winters.

Plant Invaders

- **Native invaders:** Bombax ceiba (Simalu), Lagerstroemia speciosa (Ajar).
- **Exotic invasives:** Chromolaena odorata, Ageratum conyzoides, Parthenium hysterophorus, Mikania micrantha.

Anthropogenic Factors

- Floods from Brahmaputra + Dibru rivers.
- Villages located within park boundaries → grazing, extraction, settlement pressure.

Ecological Impact

- Grassland → shrubland → degraded forest conversion.
- Threatens **grassland-obligate fauna:**
  - Bengal florican (Houbaropsis bengalensis) – Critically Endangered.
  - Hog deer (Axis porcinus).
  - Swamp grass babbler (Prinia cinerascens) – Endemic.
- • Reduces carbon storage, aggravates climate change.

Exotic invasives

Chromolaena odorata (Siam weed)
Native: Central & South America
Invades: Forest gaps, grasslands, plantations
Impact: Outcompetes native flora, increases fire hazards.
Ageratum conyzoides (Billygoat weed)
Native: Tropical America
Invades: Croplands, roadsides, wastelands
Impact: Allelopathic (releases chemicals that suppress other plants), reduces crop yield.

Parthenium hysterophorus (Congress grass / Carrot weed)
Native: Tropical America
Invades: Agricultural fields, open lands, wastelands
Impact: Causes skin allergies, respiratory issues in humans, toxic to livestock, replaces fodder grasses.
Mikania micrantha (Mile-a-minute weed)
Native: Central & South America
Invades: Forest edges, tea gardens, wetlands
Impact: Fast-growing climber, smothers trees, reduces biodiversity, major problem in North-East India (including Dibru-Saikhowa).

Key points from article

Way Forward

- **Policy & Governance:**
- Integrate DSNP conservation under **National Action Plan on Invasive Alien Species (MoEFCC draft, 2023).**
- Strengthen eco-sensitive zone management around DSNP.
- **Ecological Measures:**
- Assisted grassland regeneration (reseeding native grasses, controlled burning).
- Restoration of riverine floodplain balance.
- **Community Participation:**
- Eco-tourism models involving local villages (employment + stake in conservation).
- Livelihood alternatives to reduce dependence on park resources.
- **Research & Monitoring:**
- Use remote sensing for **continuous LULC monitoring.**
- Long-term biodiversity census of grassland fauna.

Attempt it !!

Q. With reference to Dibru–Saikhowa National Park (DSNP), consider the following statements:
1. It has been designated as a Biosphere Reserve under UNESCO's Man and Biosphere Programme.
2. It is famous for its population of feral horses and is an important site for migratory birds.
3. The park mainly consists of dry deciduous forests with very little wetland ecosystem.
Which of the statements given above is/are correct?
(a) 1 and 2 only (b) 2 only
(c) 1 and 3 only (d) 1, 2 and 3
Answer: (b) 2 only
Statement 1 – Incorrect: It was designated a Biosphere Reserve by the Government of India in 1997, but not under UNESCO MAB.
Statement 2 – Correct: Known for feral horses, migratory birds, and rich biodiversity.
Statement 3 – Incorrect: Dominated by moist mixed forests, grasslands, canebrakes, and swamp ecosystems, not dry deciduous forest.