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Feeding 1.5 billion safely

An average Indian farmer utilizes nearly eight times fewer chemicals per hectare than the global average, and twelve times less than counterparts in the US and Europe. These objective datapoints prove that India's baseline chemical intensity is remarkably low, showing that global characterizations of widespread chemical excess are mathematically ungrounded

The average human life expectancy in India has risen to over 68 years, a substantial jump from the baseline of approximately 32 years recorded at independence in 1947. This critical advancement has been driven by systematic, technology-backed modernisations, including optimized irrigation networks, high-yielding seeds, resilient fertilizers, and targeted crop protection products. Driven by the Green Revolution, the nation successfully broke free from the shackles of chronic food deficits to feed its millions, achieving sustained self-sufficiency and commanding massive productivity surpluses in global food production. Crucially, this low-input, highly productive agricultural system now positions the nation to double its current agricultural exports from a stagnant \$50 billion to its true \$100-billion global trade potential within the next three years. Critics who attack this legacy frequently rely on outdated historical baselines.

Highly toxic, first-generation chemicals marketed in the sixties and early seventies – such as endrin, lindane, and hexachlorocyclohexanes (HCH) – were systematically banned and purged from the domestic market decades ago, leaving exceptions like restricted DDT use strictly confined to public health vector control.

India has achieved a critical milestone under its global commitments, moving to completely replace DDT in public health with safe, modernized alternatives. Modern Indian agriculture operates on a rigorous, data-verified foundation where plant protection products are applied at judicious, targeted levels, completely dismantling the archaic notion that India's crop surpluses are bought at the cost of widespread environmental poisoning. Despite this scientific evolution, sensationalist media and external advocacy groups frequently weaponize regional narratives to tarnish the country's agrarian reputation, creating non-tariff trade barriers that explicitly freeze India's export growth. The primary vehicle for this alarmism is the "Cancer Train" narrative. The "myth" of this specific transit route is not that sick passengers do not exist, but rather the highly exaggerated, unscientific narrative that frames the region as a catastrophic, pesticide-induced wasteland and brands Punjab as India's "cancer capital".

The reality behind "Train No. 14888/339, which runs an overnight 325 km route from Bathinda in Punjab to Bikaner in Rajasthan, is fundamentally economic rather than environmental. Indian Railways offers free tickets for cancer patients and steep discounts for their companions. This transforms the train into a critical financial lifeline heading toward the Acharya Tulsi Regional Cancer Hospital and Research Centre in Bikaner, a premier facility renowned for highly affordable, subsidized oncology care. The train serves as a general transit and multi-use medical corridor, carrying passengers seeking various



low-cost diagnostic treatments alongside its noticeable contingent of oncology patients. Comprehensive public health data confirms that Punjab actually ranks in the lower to moderate tiers of per-capita cancer incidence compared to several other Indian states, flatly contradicting the "cancer belt" hysteria.

Patients board this train not because healthcare infrastructure in Punjab is non-existent, but because Bikaner's government-backed subsidies offer unparalleled relief to low-income families. Attributing these regional cases solely to Green Revolution agrochemicals oversimplifies a complex disease. Medical experts universally recognize that cancer is a multifactorial condition driven heavily by lifestyle factors, widespread tobacco use, regional dietary habits, genetics, and

general aging, rather than a single environmental factor. When subjected to rigorous mathematical normalization, the claim that India overuses agricultural chemicals collapses completely. Comprehensive data compiled by the Food and Agriculture Organization (FAOSTAT) establishes that the global average for pesticide application stands firmly at 2.40 kg per hectare (kg/ha). Highly industrialized nations apply crop protection chemicals at vastly higher densities. China leads the high-input index at an intense 13.07 kg/ha, followed closely by Japan at 11.80 kg/ha, while Western agricultural hubs like Germany and the United States maintain application densities of 4.00 kg/ha and 3.57 kg/ha, respectively. In sharp contrast to these heavily intensive systems, India's national average footprint remains remarkably low, hovering between 0.29 and 0.31 kg/ha. This means an average Indian farmer utilizes nearly eight times fewer chemicals per hectare than the global average, and twelve times less than counterparts in the US and Europe. These objective data points prove that India's baseline chemical intensity is remarkably low, showing that global characterizations of widespread chemical excess are mathematically ungrounded.

The ultimate exposure of this global defamation campaign lies in a direct, side-by-side comparison of international epidemiological statistics against India's actual oncological standing. According to official data from the World Health Organization's International Agency for Research on Cancer (IARC GLOBOCAN), nations with the heaviest agricultural chemical dependencies report the highest cancer frequencies on Earth. The global average age-standardized cancer incidence rate stands at 196.9 cases per 100,000 population. Heavily industrialized countries scale to alarming numbers: Australia leads the world at a staggering 462.5 cases per 100,000, New Zealand records 422.9, Ireland logs 375.5, and the United States hits 365.0 per 100,000 (see chart).

Now consider India's position on this exact same global platform. India ranks near the bottom tier of global cancer strike rates at a mere 10.41 cases per 100,000 population – nearly half the global average and less than a third of that frequency observed in North America and Western Europe. If Indian crop

inputs were causing a widespread health catastrophe, India's numbers would mathematically eclipse the global baseline. Instead, the reality of the data blows the false health link apart. It proves that India is successfully feeding its one and a half billion people with vastly safer, lower-residual food, and that its actual health profile has been deeply distorted by external actors. If the data vindicates Indian farming, why does international scrutiny persist? The answer lies in the geopolitical weaponization of Maximum Residue Limits (MRLs) to construct non-tariff trade barriers.

International advocacy networks regularly monitor compliance portals like the European Commission's Rapid Alert System for Food and Feed (RASFF). Between mid-2024 and mid-2026, European border customs issued

365 distinct notifications halting Indian agricultural consignments. These actions were rarely driven by genuine toxicological hazards, instead, they stemmed from minor technical deviations against the EU's default analytical threshold of 0.01 mg/kg – a near-zero limit equivalent to just 1 gram of active ingredient per 100 metric tons of agricultural produce. Minor overages of ethylene oxide in spice blends or tricyclazole in Basmati rice are routinely amplified by Western agricultural lobbies and foreign-funded advocacy groups to brand all Indian produce as "toxic." This strategy serves a clear economic function. By triggering public anxiety over imported food items during Free Trade Agreement (FTA) negotiations, protectionist lobbies pressure governments to enforce arbitrary screening blockades.

This insulates Western domestic farmers from competing with highly affordable, competitive Indian agricultural goods. According to data from the Agricultural and Processed Food Products Export Development Authority (APEDA), these targeted trade disruptions cost the Indian economy an estimated \$340 million annually in lost cargo valuation, mandatory returns, and cancelled contracts, directly penalizing high-value fruits, chilies, and processed foods. To protect its international trade potential and secure its farming communities, India must transition beyond passive defence to implement aggressive, structural reforms at the policy and ground levels: Enact a Modernized Pesticides Management Bill: The regulatory framework must supplant the outdated Insecticides Act, 1968. The revised legislation must mandate a strict twelve-month sunset window to systematically review existing chemical registrations. Because India spans diverse tropical and sub-tropical climates, its agronomic requirements naturally differ from Western ecosystems. India actively cultivates a record 554 distinct crops – a biological diversity unmatched globally – meaning molecule choices must be tailored to specific local pest matrices. Uphold Scientific Sovereignty: The

World Health Organization (WHO) explicitly states that sovereign nations have the independent authority to determine their own pesticide protocols based on local crop cycles, weather variables, and insect patterns. For instance, while non-rice-producing nations may ban paddy-specific chemistries due to lack of local utility, India must preserve inputs critical to its staple rice security. Historically, the Ministry of Agriculture and Farmers Welfare has relied on scientific peer-review panels – including the Dr. Bami, Dr. Banerjee, Dr. Mayee, Dr. R.B. Singh, and Dr. Anupam Verma Committees – to restrict or phase out harmful agents based on objective consensus rather than arbitrary external narratives. Accelerate the Shift to Green Chemistry: India has actively phased out highly toxic legacy formulations (historically marked by red rectangle labels). These high-volume inputs have been replaced with advanced green chemistry solutions that drop environmental load down from multiple kilograms per hectare to a precise 20 to 100 grams per hectare. Consequently, Ministry of Chemical & Fertilizer data shows that while the national acreage under plant protection expands annually to bridge yield deficits, the total physical volume of chemicals consumed continues to decline. Currently, only 40-50 per cent of India's arable land utilizes structured plant protection, leaving room for sustainable infrastructure growth.

Eradicate Spurious Inputs with Blockchain Traceability: Unlicensed, counterfeit manufacturers operating with legitimize CIB registration routinely exploit credit-deficient smallholders by pushing unauthorized chemical cocktails misbranded as "organic formulations" or "bio-stimulants". A recent market analysis in Karnataka examining 250 suspicious samples revealed an alarming reality: 100 per cent of the audited products were illicit chemical cocktails, some containing up to 12 undeclared synthetic molecules. This included unmapped entries like nitenpyram and pyridaben, which are unregistered in India and point to cross-border smuggling networks. Enforce Heavy Legal Penalties: The bill must neutralize these elements by enforcing non-bailable criminal prosecution, a minimum 7-year prison term, and a Rs 50 lakh fine for input counterfeiting. This enforcement loop must be locked via a mandatory National Agrochemical Traceability Network, using serialized, tamper-proof QR codes on all packaging to map every container from the factory to the field. All labels must explicitly display the manufacturer's name, address, email, contact numbers, and proper educational leaflets. Scale Precision Biocontrol via FPOs: Self-servicing by untrained individuals must be systematically phased out. Farmer Producer Organizations, NGOs, agricultural cooperatives, and institutional bodies must be financially incentivized to deploy professional "Spray Doctor" modules. Equipped with advanced AI-driven precision agricultural drones and proper Personal Protective Equipment (PPE), these specialized teams will minimize occupational exposure, expand the use of eco-friendly biocontrols like Trichoderma viride, and guarantee strict compliance with mandatory Pre-Harvest Intervals across all chemical, biological, or nutrient inputs. By combining an unyielding, data-backed defence on the international stage with a rigorous internal clean-up of our domestic supply chains, India can protect the health of its farmworkers while securing its position as an unassailable trade powerhouse. Removing these non-tariff trade bottlenecks gives India the direct capacity to break through its current \$50 billion agricultural export stagnation and double its global trade footprint to \$100 billion within the next three years.



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1. Context (Agriculture | Crop Protection | Food Security | Public Health | GS III)

India is strengthening science-based crop protection through safer technologies, precision agriculture and better regulation to ensure food security, public health and export competitiveness.

2. Key points

I. Crop Protection in Indian Agriculture

- India uses only 0.31 kg/ha of pesticides against the global average of 2.40 kg/ha, nearly one-eighth of the global average.
- About 40–50% of India's arable land is under structured plant protection.
- Crop protection has supported the Green Revolution, transforming India from a food-deficit to a food-surplus nation and contributing to agricultural exports of nearly \$100 billion.

II. Transition Towards Sustainable Crop Protection

- India has phased out DDT from agricultural use and shifted towards safer, targeted pesticides.
- Precision agriculture has reduced pesticide application to 20–100 g/ha in several crops.
- Modern crop protection aims to balance productivity, environmental sustainability and public health.

III. Challenges

- Cancer incidence in India (104.1/100,000) remains significantly lower than Australia (462.5), New Zealand (422.9), Ireland (375.5) and the USA (365.0), while health outcomes depend on multiple factors beyond pesticide exposure.
- Increasingly stringent Maximum Residue Limits (MRLs) and Rapid Alert System for Food and Feed (RASFF) standards have emerged as major challenges for India's agricultural exports, often functioning as non-tariff trade barriers.
- The spread of illegal and counterfeit pesticides, with a survey detecting undeclared chemicals in sampled products, poses risks to farmers, consumers and exports.

IV. Way Forward

- Periodically review pesticide regulations based on Indian agro-climatic conditions and scientific evidence.
- Expand Integrated Pest Management (IPM), precision agriculture, drone spraying and AI-based advisory services.
- Strengthen QR-based traceability, quality surveillance and enforcement against counterfeit pesticides to improve food safety and export competitiveness.



SOMIT DASGUPTA

The Indian space sector has been in the news recently. A launch vehicle made in the private sector has successfully put a payload in the desired orbit. Not only that, it did so in its very first attempt which was not achieved even by Elon Musk's Space X.

This feat is a classic case of public-private partnership since the Indian Space Research Organisation (ISRO) did all the hand holding including providing its infrastructure for the launch. It will take a while for the private sector to break the umbilical chord from ISRO and handle all the operations independently using its own infrastructure.

Incidentally, in the US, all the private space operators function independently of the National Aeronautics and Space Administration (NASA).

The Indian space sector was thrown open to the private sector in 2020 and there are about 400 start-ups already up and about. The total business, it is estimated to be around \$8.4 billion today which is about 2-3 per cent of the world market. Prior to 2020, the Indian space programme was solely led by ISRO. ISRO was set up in 1969 to develop and apply space technology for various national needs. The government decided to rope in the private sector for various reasons.

The first and foremost is that the government was desirous of getting additional financial resources to fund space activities within the country, be it private or public. Also, ISRO was keen that the private sector should handle launching of satellites, a lucrative business, while ISRO could concentrate on specialised research programmes.

With the private sector moving into the area of space, there are a lot of issues which need to be tied up and for this purpose, the government has set up an organisation called the Indian National Space Promotion and Authorisation Centre (IN-SPACe).

There are a host of activities which need to be addressed by IN-SPACe.

The two major ones are: first, this organisation will have to ensure a level playing field between the public and the private sector. Second, IN-SPACe will also have a regulatory role and as far as the private sector is concerned, it has to



Manpower issues in space, nuclear power

PRIVATISATION FLIP SIDE. The lack of skilled personnel will impact the operations of both private and public sectors

ensure that its activities are in harmony with all the international treaties on space where India is a signatory.

TALENT HUNT

Meanwhile, it seems that over a hundred scientists have left ISRO last year possibly because the private sector is offering not only better salaries but also stock options. The fact that government jobs are bereft of meritocracy is also proving to be a disadvantage.

The government has decided to put restrictions on senior scientists leaving ISRO. This especially applies to scientists working in specialised space projects such as Gaganyaan and Chandrayaan. While the concern of the

government is well appreciated, it was only obvious that such a situation would eventually arise. The private sector has no option but to source its manpower from ISRO and its affiliates. Getting expatriates to work here at much higher salaries was never really an option. If availability of manpower becomes a critical issue for the private sector, it is going to choke its growth and the vision of the government to engage ISRO only in research activities may falter.

NUCLEAR ISSUES

A similar manpower crunch is also likely to occur in nuclear generation. Now that the private sector has the option of moving into nuclear generation aided by the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, there is going to be a clamour for manpower with the requisite skills. Already a number of leading industrial groups are proceeding full steam for nuclear generation.

One of them is evaluating sites across several States to deploy large modular

reactors and is in talks with global leaders for collaboration. Another major industrial house plans a 6000-MW nuclear plant in Ratnagiri, Maharashtra.

Yet another industrial house has committed \$2 trillion to develop a 7.2 GW nuclear power capacity. Needless to say, the private sector will depend upon organisations like the Nuclear Power Corporation of India (NPCIL) and the Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI) for sourcing their manpower needs.

The government will soon have to prepare a contingency plan to deal with this issue. Drain of manpower from the public sector was also experienced when private banking and insurance companies mushroomed in India.

Manpower requirements along with other inputs have to be assessed prior to privatisation. We owe it to the private sector to keep them informed of the difficulties that they may face in getting indigenous manpower.

1. Context (Science & Technology | Space | Nuclear Energy | Human Resource Development | GS III)

India's strategic sectors are undergoing structural reforms, making skilled manpower a critical factor for sustaining technological advancement and industrial growth.

2. Key Points

I. Growth of India's Space Sector

- India opened the space sector in 2020, resulting in nearly 400 start-ups and a market of about \$8.4 billion (2–3% of the global market).
- ISRO shifted from being the sole operator to an enabler, while IN-SPACe was created to regulate private participation and ensure a level playing field.

II. India's Model vs the United States

- Unlike the United States, where private companies operate independently of NASA, India's private space sector continues to depend heavily on ISRO for infrastructure, technology and technical support.
- The long-term objective is to build an independent and globally competitive private space ecosystem.

III. Emerging Manpower Challenge

- Expansion of private companies has intensified competition for experienced scientists and engineers.
- Better salaries and stock options have accelerated talent migration from ISRO, while restrictions on the movement of scientists offer only a temporary solution.
- Continued dependence on ISRO for manpower may weaken both private-sector expansion and ISRO's research capabilities.

IV. Similar Concerns in the Nuclear Sector

- Private participation in nuclear energy under the Sustainable Harnessing and Advancements in Nuclear Energy (SHANTI) Act is expected to create a similar demand for specialised manpower.
- Projects involving Small Modular Reactors (SMRs), the proposed 6000-MW Ratnagiri plant, and planned 7.2 GW nuclear capacity will require a large pool of skilled scientists, engineers and technicians.

V. The Way Ahead

- Develop a long-term national manpower strategy for strategic sectors.
- Strengthen STEM education, specialised training and industry-academia collaboration.
- Improve career opportunities in public research institutions while creating a sustainable talent pipeline for both public and private sectors.

The here and now of a 'forever war' period

As multipolarity solidifies, a new stable equilibrium could be ushered in — one in which States realise attacking others will not alter the balance of power in their favour

Although there have been several on-off announcements about negotiations, ceasefires, and deals to end the conflict between Russia and Ukraine, and between US-Israel and Iran, we are staring at a grim reality. Protracted conventional armed conflicts among countries are back in vogue, growing at an alarming rate, and proving to be intractable.

A study by the Norway-based Peace Research Institute Oslo (PRIO) finds that direct inter-State conflicts have doubled in the past few consecutive years, jumping from two in 2023 to four in 2024, and reaching eight in 2025, which is the highest since data collection began in 1946. Comparing the current upward trajectory in inter-State wars with the Cold War era (1946-1989) and the post-Cold War era (1990-2020), it looks like humanity is going backwards, in the direction of savagery, instead of moving forward towards civilisation.

The Cold War period saw an average of two to four active inter-State

conflicts per year, headlined by the Korean War (1950-1953), the Vietnam War (1965-1973), the India-Pakistan Wars (1948, 1965 and 1971), the Arab-Israeli Wars (1948, 1956, 1967 and 1973), and the Iran-Iraq War (1980-1988). Even though civil wars or internal wars outnumbered inter-State wars, the wars between States were deadly and accounted for up to four million battle-related deaths. What made things worse was that the average duration of these inter-State wars — many were prolonged by superpower-fuelled ideological proxies — was around 16 to 24 months.

The post-Cold War period offered a welcome respite from this dreadful dynamic. Thanks to the end of the ideological contest between capitalism and Communism and the weakening of all power centres except the US, this era had an average of only one to two active inter-State wars per year lasting approximately three to four-and-a-half months. Fewer inter-State wars brought relief because international order rests on mutual respect for sovereignty and territorial integrity of States. If inter-State wars lessen, it introduces systemic stability and makes intergovernmental institutions such as the United Nations (UN) more effective. No wonder, therefore, that the post-Cold War phase was a golden era for the UN.

But since 2020, this relatively benign phase has been replaced by a ferocious new trend of frequent and lengthy

inter-State wars that have once again marginalised the UN. The Russia-Ukraine war has exceeded four-and-a-half years of continuous fighting. The multiple wars involving Israel, Lebanon and the Palestinian Territories have dragged on for three years. And the US and Israeli war on Iran which began in 2025, ebbed for a while, and then resumed in 2026, looks opened with no closure. There have been some short multi-day conflicts between Armenia and Azerbaijan (2020) and between India and Pakistan (2025), but it is anyone's guess whether these will reignite after a pause.

One key factor behind the sharp uptick in inter-State wars and their longevity is something that is normally viewed as a positive development — the onset of a multipolar world. With more power centres emerging, the willingness to attack directly or to sponsor proxies that can withstand aggressors as part of global geopolitical rivalries has grown. If the original Cold War featured two superpowers that destabilised the world by arming their proxies, the current "new Cold War" is diffused, with more players. A small Ukraine would not have held on for so long against a big Russia if it wasn't for both the US and Europe backing the former militarily and economically. And Iran's resistance against the much superior Israel and the US owes to the intelligence, targeting, satellite, technological, and economic backing of Russia and China.



Sreeram Chaulia



A small Ukraine would not have held on for so long against a big Russia if it wasn't for both the US and Europe backing the former.

AFF

Pakistan's propensity to carry out large-scale terrorist attacks in India, which New Delhi says would be considered "acts of war" from now on, is also rationalised by the active military and economic support Islamabad receives from Beijing. Operation Sindoor in 2025 was relatively short but saw high-intensity war-like clashes because Pakistan was emboldened by Chinese weaponry, intelligence, economic and diplomatic sympathies. As India grows economically faster than China and is likely to reduce the power gap with China in years to come, their Asian Cold War is likely to trigger more India-Pakistan wars or mini-wars by proxy association.

Apart from complex multipolarity, the other reason why inter-State wars are growing and lasting longer is the shift in modern military technology. Stronger attackers believe they have the upper hand and initiate wars, but defensive weaponry and tactics are improving. Drones, anti-tank, anti-air and anti-aircraft missiles and counteroffensive strike capabilities have prevented easy walkovers for the attackers. Presidents Vladimir Putin and Donald Trump have found that weak opponents can withstand land

invasions or aerial bombardments for years due to this change in the structure of warfare.

Given these underlying structural shifts, is there no light at the end of the tunnel and are we condemned to suffer "forever wars"? The good news is that as multipolarity solidifies, and once power transitions are completed, a new stable equilibrium could be ushered in, in which States realise it is too costly to attack other States, since attacking will not alter the balance of power in their favour. And with time, as defensive military technology advances further, it too may deter offensive States from daring to attempt invasions and regime changes. For instance, China may decide not to attack or to delay attacking Taiwan after seeing the way Ukraine and Iran warded off Russia and the US for years.

The bad news is that until we reach stable equilibrium points that deter attackers, more inter-State wars that grind on by attrition are possible. It is a scary thought, but one we must brace for.

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1. Context (International Relations | Global Security | Geopolitics | GS II)

The global order is transitioning from a unipolar to a multipolar system, leading to renewed geopolitical competition, prolonged interstate conflicts and evolving patterns of warfare.

2. Key Points

I. Changing Global Security Landscape

- Interstate conflicts are increasing after the relatively stable post-Cold War period.
- According to [the Peace Research Institute Oslo \(PRIO\)](#), interstate conflicts rose from 2 (2023) to 4 (2024) and 8 (2025)—the highest since 1946.
- Unlike the post-Cold War era, prolonged conventional wars are once again becoming a dominant feature of international politics.

II. From Unipolarity to Multipolarity

- The post-Cold War order was characterised by US dominance, fewer interstate wars and stronger respect for sovereignty and territorial integrity.
- The rise of multiple power centres has intensified strategic competition, proxy conflicts and geopolitical rivalries.
- Major powers increasingly support allies through military, economic and technological assistance rather than direct intervention.

III. New Nature of Warfare

- Contemporary wars are becoming longer, costlier and attrition-based, sustained by external military and economic backing.
- The Russia–Ukraine war, conflicts involving Israel, Lebanon and Palestine, and the US–Israel–Iran confrontation illustrate this changing pattern.
- Modern technologies—drones, precision missiles, anti-tank and air-defence systems—have strengthened defenders, making quick military victories increasingly difficult.

IV. Implications for India

- China's growing military capabilities and continued support to Pakistan could intensify security challenges for India.
- The possibility of proxy conflicts and prolonged regional confrontations may increase as strategic competition in Asia deepens.
- India must strengthen military preparedness, technological capability and strategic partnerships to safeguard its interests.

V. Future Outlook

- Multipolarity may eventually create a new balance of power, reducing incentives for outright aggression once power transitions stabilise.
- Until such an equilibrium emerges, the world is likely to witness more prolonged interstate conflicts, requiring stronger deterrence, resilient institutions and sustained diplomatic engagement.

Consider the following :

1. Demographic performance
2. Forest and ecology
3. Governance reforms
4. Stable government
5. Tax and fiscal efforts

For the horizontal tax devolution, the Fifteenth Finance Commission used how many of the above as criteria other than population area and income distance?

- (a) Only two
- (b) Only three
- (c) Only four
- (d) All five

Fiscal federalism, efficiency versus equity concerns

The Finance Commission, an institutional innovation embedded in India's constitutional architecture, was never intended to be a routine allocator of funds. It was designed as a central pillar of India's fiscal federal compact and as a corrective institution that would mediate the inherent asymmetry between a fiscally dominant Union and structurally constrained States, while also addressing deep horizontal inequalities arising from history, geography, and institutional capacity. In a country marked by uneven development at Independence, the Commission's central mandate was to safeguard the interests of the States and thereby preserve a strong Union.

Each successive Commission, cognisant of its historical context, has interpreted this mandate in its own way, yet all have contributed to sustaining India's fiscal federal compact. The recently submitted report of the 16th Finance Commission (FC-16), chaired by Arvind Pangariya and covering the period 2026-31, marks a decisive turning point. While it retains the vertical devolution of central taxes to the States at 41%, it fundamentally re-engineers the structure of fiscal transfers, particularly grants-in-aid. In doing so, it prioritises efficiency and performance but raises serious concerns about equity and constitutional intent. At the heart of the issue lies a deeper question: has the Commission moved away from its equalising role toward one that implicitly protects the Union's fiscal primacy?

The constitutional logic of grants-in-aid

Evidently, the provision for grants-in-aid under Article 275 was not an afterthought; it was a foundational design element. In a country more diverse than any other in the world, tax devolution, however sophisticated its formula, cannot account for the diversity of State-specific needs. For instance, Kerala's "export-oriented" human capital development strategy has accounted for nearly 23% of India's total remittances, thereby strengthening the country's external sector. However, this has come at a cost to the State's fiscal health, as it has had to rely on borrowing to finance investments in education.

Similarly, Punjab has played a critical role in ensuring national food security, but at the cost of its revenue base, by focusing on the production of wheat and rice, which are non-taxable apart from paying the price of being a border State. The same is true of the hill States, which face high infrastructure costs; the north-eastern States, which grapple with connectivity constraints; and fiscally stressed States burdened by demographic pressures and social sector commitments.

Grants-in-aid were therefore conceived as instruments of equalisation, enabling targeted support for States with special needs where formula-based tax devolution falls short. The FC-14



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The Sixteenth Finance Commission risks moving away from its core mandate of acting as an equalising force within the federal

and the FC-15 recognised this reality by retaining Revenue Deficit Grants (RDGs), sector-specific grants, and State-specific grants.

The FC-16 departs sharply from this tradition. It recommends grants-in-aid of ₹9.47 lakh crore, compared with ₹10.1 lakh crore under the FC-15, while their share in total Finance Commission transfers has more than halved, from 19.4% to 8.3%. By restricting grants-in-aid to local bodies and disaster management, it eliminates RDGs, sector-specific grants, and State-specific grants.

While retaining the States' share in the divisible pool at 41%, despite the demand from 18 States to raise it to 50%, the Commission presumes that improved fiscal discipline should enable States to manage their finances without additional gap-filling transfers. However, this reasoning rests on a problematic assumption: that fiscal capacity across States is sufficiently uniform for devolution to be self-equalising.

Empirically and historically, this assumption is untenable. The Commission's justification for doing away with RDGs is rooted in concerns about fiscal prudence. It argues that RDGs create moral hazard by incentivising States to underperform in revenue mobilisation or overspend in the expectation of central support.

It also points to aggregate data suggesting that the States, taken as a whole, are not in severe fiscal distress. Yet, this aggregate view masks deep inter-State disparities, with some States remaining fiscally stressed despite contributing disproportionately to national development and continuing to require fiscal assistance. The very purpose of RDGs was to recognise this heterogeneity, as a fiscal surplus in one State cannot offset a fiscal deficit in another.

More troubling is the contrast between the Commission's stance on RDGs and its treatment of cesses and surcharges. While advocating fiscal discipline for States through the withdrawal of RDGs, it stops short of recommending any binding rollback of these non-shareable Union levies ignoring the demand by many States.

Dual shift

Instead, it proposes a "grand bargain", whereby the Centre would gradually merge cesses into the divisible pool in exchange for States accepting a lower devolution share. This asymmetry is difficult to overlook. RDGs are removed in the name of discipline, yet cesses – arguably a more distortionary instrument from a federal perspective – are only gently nudged toward reform. The resulting framework imposes stringency on States while preserving fiscal flexibility for the Union. This dual shift, protecting Union revenues while constraining State support, raises a fundamental concern: is the Commission inadvertently reinforcing vertical imbalance rather than correcting it?

The consequences are particularly severe for

States that already face structural disadvantages. As many as eight States, including most of the disadvantaged north-eastern States and fiscally stressed West Bengal, are set to experience a reduced share in both tax devolution and grants-in-aid, while another six States have seen a decline in their share of grants. The problem is further compounded by the reduction in the weight assigned to income distance (from 45% to 42.5%) and the introduction of a 10% weight for contribution to GDP. When combined with the removal of the RDGs, which accounted for about 20% of Finance Commission grants in 2024-25, this creates a double burden: lower tax devolution and the absence of compensatory grants. The Commission's implicit assumption that efficiency should trump equity risks widening regional disparities.

Another defining feature of the FC-16 is its emphasis on tied and performance-based grants, particularly for local governments. While the allocation of nearly ₹7.2 lakh crore to the third tier is commendable, the conditionalities attached to these grants are stringent, linking the release of funds to targets in water and sanitation, revenue mobilisation, and audited accounts. This approach promotes accountability, but it also reduces fiscal autonomy. In effect, the architecture of grants shifts from need-based equalisation to compliance-based incentivisation. Fiscal discipline, while necessary, cannot substitute for fiscal justice.

Efficiency versus equity

The FC-16's report is bold in ambition but uneven in balance. The dismantling of the RDGs and the shift toward performance-based transfers reflect a technocratic confidence in market-like incentives, even though fiscal federalism is a political and constitutional arrangement designed to manage diversity. The contrast between the Commission's strict stance on RDGs and its accommodative approach to cesses and surcharges, along with its hesitation to raise the States' share in the divisible pool to 50% despite demands from several States, reveals a deeper tension.

It suggests a framework that, intentionally or otherwise, protects the fiscal space of the Union while placing a greater adjustment burden on the States. In doing so, the Commission may have moved away from its core mandate of acting as an equalising force within the federation. If the Finance Commission is to continue playing its historic role in holding India together, future Commissions must reward high-performing States while supporting those that continue to face structural disadvantages.

For a country as diverse as India, fiscal federalism cannot be sustained on performance alone; it must be anchored in fairness.

HORIZONTAL DEVOLUTION FORMULA

Parameter	15th FC	16th FC
Population (as per 2011 census)	15%	17.50%
Demographic performance	12.50%	10%
Area	15%	10%
Forest	10%	10%
Per capita GSDP distance	45%	42.50%
Tax and fiscal efforts	2.50%	-
Contribution to GDP	-	10%

1. Context (Polity | Fiscal Federalism | Finance Commission | Cooperative Federalism | GS II)

The recommendations of the 16th Finance Commission (2026–31) have revived the debate on whether India's fiscal transfer system should prioritise efficiency or continue its constitutional role of equalising regional disparities.

2. Key Points

I. Constitutional Role of the Finance Commission

- Established under **Article 280**, the Finance Commission is intended to maintain the fiscal balance between the Union and the States through tax devolution and grants-in-aid.
- **Article 275** provides for grants-in-aid to support States with special needs and reduce horizontal fiscal inequalities.
- Fiscal federalism aims to strengthen cooperative federalism by balancing fiscal capacity across States rather than merely distributing revenue.

II. Major Changes in the 16th Finance Commission

- The Commission has retained the States' share in the divisible pool at 41% under Article 270, but has significantly restructured transfers.
- It recommends ₹9.47 lakh crore as **grants-in-aid** compared with ₹10.1 lakh crore under the 15th Finance Commission.
- The share of grants in total Finance Commission transfers declines from 19.4% to 8.3%.
- **Revenue Deficit Grants (RDGs)**, sector-specific and State-specific grants have largely been discontinued, with greater emphasis on local body and disaster management grants.



III. Efficiency versus Equity

- The recommendations assume that stronger fiscal discipline will improve State finances by reducing dependence on Central transfers.
- Reducing the weight assigned to income distance (45% to 42.5%) and introducing a 10% weight for contribution to GDP favour relatively stronger economies.
- States with structural disadvantages, particularly several North-Eastern States and fiscally stressed States such as West Bengal, may receive relatively lower support.

IV. Concerns for Fiscal Federalism

- The withdrawal of Revenue Deficit Grants (RDGs) weakens an important equalisation instrument for fiscally weaker States.
- The continued reliance on cesses and surcharges, which are outside the divisible pool, limits the effectiveness of tax devolution despite demands for greater sharing.
- Greater reliance on performance-based grants links transfers to compliance and measurable outcomes but may reduce fiscal autonomy and overlook differing State capacities.

V. Way Forward

- Preserve the constitutional objective of equalisation while promoting fiscal responsibility.
- Rationalise cesses and surcharges by increasing their inclusion in the divisible pool to strengthen cooperative federalism.
- Design Finance Commission criteria that recognise regional diversity, historical disadvantages and differential fiscal capacities.
- Balance performance incentives with adequate need-based grants to ensure both efficiency and equity in India's fiscal federal structure.

Consider the following statements :

1. Asiatic lion is naturally found in India only.
2. Double-humped camel is naturally found in India only.
3. One-horned rhinoceros is naturally found in India only.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Consider the following statements :

1. Lions do not have a particular breeding season.
2. Unlike most other big cats, cheetahs do not roar.
3. Unlike male lions, male leopards do not proclaim their territory by scent marking.

Which of the statements given above are correct ?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

The road ahead for the Asiatic lion

Six decades of conservation have increased the Asiatic lion population from about 100-150 to over 1,000, with nearly half now living outside the protected area; however, the species remains confined to single forested landscape, while habitat fragmentation, disease threats continue to pose major conservation challenges

FULL CONTEXT

Meena Venkataraman

The only free-ranging population of the Asiatic lion today survives in and around the Gir National Park and Sanctuary. The semi-arid landscape of Gir extends into expansive agricultural fields and traditional grasslands, forming a checkerboard landscape matrix. Dispersing lions use these habitats as passages, stepping stones, and refuges as they navigate riverbeds and mountainous terrain, eventually establishing territories far from their source population.

Lions today occupy habitats as ecologically distinct as the rugged hills of Girnar, the forests of Mithiyala, the landscapes around Savarkundla-Liliya, and the sandy coastal tracts stretching across Saurashtra to the Bhavnagar coast. What is perhaps most remarkable is that, at their destinations, these lions are accommodated by the local people.

As is evident, the challenge of lion conservation in Gujarat rests not only on protecting Gir, but also on safeguarding the network of habitats and corridors through which lions disperse and establish new territories. Around 50 lions inhabit the coastal habitats of Jafraabad Taluka, linked to the larger lion population through Babarkot. Significantly, the Gujarat Forest Department's 2025 lion population estimation identifies this coastal sector as Satellite IV, one of nine recognised lion populations in the State, while the Gir Management Plan explicitly designates the Babarkot area as a lion movement corridor. Together, these official documents recognise the area as both an important satellite habitat and a crucial landscape linkage for dispersing lions.

A crucial corridor under pressure

It is against this backdrop that a recent proposal to divert approximately 75 hectares of reserved forest for limestone



An Asiatic Lioness with four cubs at Gir Sanctuary on May 12, 2025. VIJAY SONE.ii

mining has generated concern. The apprehension is that such a move would run counter to the long-standing legal and management framework established to protect lion habitats and movement corridors. If mining were permitted, habitat disruption could functionally disconnect this coastal subpopulation from the larger forest-linked source population and displace lions from portions of their habitat.

The proposed project would reportedly require the felling of nearly 5,000 mature trees and affect a landscape that local communities themselves do not wish to see mined. Human-lion conflict could also intensify. The larger question is whether the prime habitat of a nationally treasured species, a landscape showcasing one of India's greatest conservation recoveries, should be sacrificed for private profit.

Over the six decades since the declaration of the Gir Sanctuary, the lion population has grown from about 100-150 individuals to a healthy population of over 1,000 today. More admirable, however, is the fact that nearly half of them now reside outside the designated protected area. Lions have, over the years, shown remarkable recovery, expansion and resilience, sustained by a resourceful habitat and a rich prey base.

The unfinished task

This success has been built through a transition from protected-area management to landscape-level conservation, supported by political will, capable administration, sustained funding and the goodwill of local communities. These have been the sturdy pillars of lion conservation.

However, the entire lion population remains confined to a single forested landscape. More puzzling has been the continued resistance to acknowledging the need for a second home for the lions. After years of downplaying the risk of disease in a geographically concentrated population, we received a jolt in 2018 when more than 20 lions succumbed to an outbreak of Canine Distemper Virus (CDV). The forest department responded with a series of immediate measures, but how we effectively applied the lessons learned from previous outbreaks?

Mortality is but a part of a natural demographic cycle. If we are to achieve long-term coexistence in shared spaces, we may even need to accommodate a degree of anthropogenic mortality. Yet the reports of lion deaths associated with babesiosis in May 2026, together with suggestions of possible CDV involvement, are worrying.

If disease exposes the vulnerability of

the population, land-use decisions expose the vulnerability of the landscape that sustains it. These controversies raise a broader question: have the once-strong pillars of the State's conservation legacy begun to weaken? Are cracks emerging in the framework that has sustained lion conservation for decades? Historically, there was little room for negotiation where lions and their habitat were concerned. Indeed, Gir remains an important case study of how protected areas were progressively expanded around the original sanctuary. Hopefully, there will be no shift in the vision underpinning the law, its application, or administrative decision-making.

Next chapter of recovery

Given the species' continuing conservation challenges, any ill-vised decision could yet turn the clock back to a far more precarious situation. The International Union for Conservation of Nature Red List tells an encouraging story: the Asiatic lion has moved from Critically Endangered to Endangered. Among the northern lion subpopulations, it is the only stable population exceeding 250 individuals and is therefore of immense global conservation significance. At the same time, the newer Green Status assessments remind us that recovery and restoration are not the same thing.

A species can recover substantially and still remain far from fully restored across its ecological and historical range. Under the Green Status framework, the lion remains largely depleted. While the lion has recovered from the brink, it remains far from fully restored across the landscape it once occupied.

The story of the Asiatic lion is one of sustained recovery achieved through six decades of unwavering conservation effort, and of the responsibility that comes with safeguarding those gains. Our goal is not merely to celebrate this legacy, but to sustain it.

(Meena Venkataraman, PhD, is a wildlife biologist with over two decades of experience in mammalian ecology, with a particular focus on the Asiatic lion)

THE GIST

▼ Landscape-level conservation, backed by political will, capable administration, sustained funding and local community support, has been the foundation of the Asiatic lion's recovery.

▼ Protecting habitats and movement corridors, addressing disease risks and securing a second home for the species are critical to sustaining India's lion conservation legacy.

1. Context (Species in News | Biodiversity Conservation | Environment | GS III)

The Asiatic lion has recovered significantly over the past six decades, but its continued confinement to a single landscape has renewed the focus on strengthening long-term conservation strategies.

2. About Asiatic Lion (Prelims Focus)

- **Scientific Name:** *Panthera leo persica*.
- **Distribution:** Endemic to the Gir Landscape, Gujarat; the world's only free-ranging Asiatic lion population.
- **Habitat:** Dry deciduous forests, scrublands, grasslands and savannah ecosystems.
- **IUCN Red List:** Endangered (EN).
- **CITES:** Appendix I.
- **Wild Life (Protection) Act, 1972:** Schedule I.

3. Conservation Journey & Key Points

I. Conservation Success

- The declaration of **Gir Wildlife Sanctuary (1965)** marked the beginning of organised lion conservation, supported by habitat protection, prey-base improvement, political commitment and community participation.
- The population has increased from about 100–150 lions in the 1960s to over 1,000 today, with nearly half the population now living outside protected areas, reflecting successful natural dispersal.

II. Conservation Beyond Gir

- **Project Lion (2020)** promotes habitat connectivity, scientific monitoring, disease management, community participation and the establishment of additional free-ranging populations across suitable landscapes.
- **The Asiatic Lion Conservation Project (2018–19)** strengthened habitat improvement, veterinary infrastructure, disease surveillance, conflict mitigation and technology-based wildlife monitoring.

III. Emerging Challenges

- Despite population recovery, the entire wild population remains concentrated in one geographical landscape, making it vulnerable to disease outbreaks, natural disasters and habitat fragmentation.
- Developmental activities, mining and infrastructure projects can disrupt wildlife corridors and reduce genetic connectivity.
- Disease outbreaks such as **Canine Distemper Virus (CDV)** and recent concerns regarding babesiosis underline the need for continuous wildlife health surveillance.

IV. Way Forward

- Establish a second free-ranging wild population to reduce extinction risk.
- Protect ecological corridors and satellite habitats through landscape-level planning.
- Strengthen disease surveillance, scientific monitoring and veterinary preparedness.
- Promote community-based conservation while balancing development with ecological sustainability.



Meghalaya launches mission to protect clouded leopards

Meghalaya has launched a dedicated programme for its State animal—the mainland clouded leopard (*Neofelis nebulosa*). On Tuesday, Chief Minister Conrad K. Sangma unveiled Mission Clouded Leopard. “The mission covers habitat protection and restoration, scientific research and long-term monitoring, stronger protection measures, landscape connectivity, capacity building of frontline staff, community participation, and public awareness. It will be guided by the Meghalaya Clouded Leopard Action Plan, now being prepared by the Forest and Environment Department,” the Chief Minister said.

Consider the following :

1. Black-necked crane
2. Cheetah
3. Flying squirrel
4. Snow leopard

Which of the above are naturally found in India?

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

1. Context (Species in News | Environment | Biodiversity | GS III)

Meghalaya has launched Mission Clouded Leopard, focusing on habitat conservation, scientific monitoring and community participation to secure the long-term survival of the species.

2. About Clouded Leopard

- **Scientific Name:** *Neofelis nebulosa* | **State Animal:** Meghalaya.
- **Habitat:** Tropical & subtropical forests | **Distribution:** North-East India, Nepal, Bhutan, Myanmar, southern China & Southeast Asia.
- **IUCN:** Vulnerable | **CITES:** Appendix I | **WPA, 1972:** Schedule I.

3. Key Points

- Mission focuses on habitat restoration, landscape connectivity, research, monitoring, capacity building and community participation, guided by the Meghalaya Clouded Leopard Action Plan.
- The Clouded Leopard (*Neofelis nebulosa*) is an arboreal cat of the tropical forests of North-East India with cloud-shaped blotches, whereas the Snow Leopard (*Panthera uncia*) is a high-altitude Himalayan species with rosette-shaped spots adapted to cold mountain ecosystems.
- Both species are protected under IUCN: Vulnerable, CITES Appendix I and Schedule I of the Wild Life (Protection) Act, 1972; however, conservation initiatives differ—Mission Clouded Leopard (Meghalaya) and Project Snow Leopard (2009).