30/04/2024 TUESDAY

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DAILY NEWS ANALYSIS

POLITY

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TECHNOLOGY

ECOLOGY

SCIENCE AND TECHNOLOGY

The Physics and Maths of **Keeping Elections Fair and** Representative

CONTEXT: Physics and Math contribute to fair elections, including historical election methods, critiquing first-past-the-post system, exploring alternatives like Condorcet and Borda systems, and using math and physics to make elections fairer.



MAJOR POINTS

HISTORICAL PERSPECTIVE: In 2024, there are around 60 national elections involving two billion people globally, including major ones like India's national elections and the U.S. presidential election. Elections worldwide are a mix of emotions, ideas, and sometimes conflict, yet they are grounded in scientific processes.

The earliest known elections, dating back 2,500 years to ancient Athens, relied on luck as candidates were randomly chosen among suitable ones. Similarly, in tenth-century Chola society in Tamil Nadu, village representatives were selected through a random 'Kudavolai' system based on the people's votes.

THE 'FIRST PAST THE POST' SYSTEM?

- Social choice theorists and mathematicians criticize the approval voting system followed by a random choice for not accurately representing people's preferences.
- The first-past-the-post (FPTP) system, used in India, the U.S., the U.K., and other countries, has drawbacks such as disproportionate seat shares compared to popular votes and winners often securing less than 50% of the vote share.
- This has led to criticism of "minority" governments ruling despite lacking majority support.
- Despite criticisms, FPTP remains popular due to its simplicity, highlighting the complex nature of finding an ideal electoral system that truly reflects the will of the people.

CONDORCET AND BORDA SYSTEMS

- Better alternatives to the first-past-the-post (FPTP) system include the Condorcet system and the Borda electoral process.
- The Condorcet system, dating back to the 13th century, ensures

that the winner, when compared against each contender. receives over 50% of the votes and is the most preferred candidate.

- However, it is complex and not widely used in national elections due to its potential to block specific candidates.
- On the other hand, the Borda process, proposed in 1784, involves ranking candidates on the ballot and redistributing votes until one candidate surpasses 50% support, ensuring a more representative outcome.
- This system is similar to rank-based voting in sporting events like the Indian Premier League.

PROBLEMS WITH RVS?

- The President of India was elected using a ranked voting system (RVS) in 1969 when no candidate secured 50% of first preference votes.
- After considering second preferences, V.V. Giri won with 50.8% support, despite having 48% first-preference votes, defeating Neelam Sanjeeva Reddy.
- However, like the Condorcet method, the original Borda method is complex and challenging for large elections like those in India.
- Kenneth Arrow's 1951 theorem showed that RVS can conflict with fairness criteria in elections, demonstrating that even popular candidates may not always win under such systems due to voting dynamics

HOW CAN MATHS, PHYSICS HELP?

- Mathematics brings clarity to the chaos of elections, while physics finds order in disorder, revealing universal patterns across different electoral systems.
- Just as molecules in a balloon create pressure despite their random movements, statistical physics teaches that order can emerge from electoral disorder.
- Analyzing two decades of election data shows consistent patterns crucial to fairness, highlighting the need to address electoral malpractices.
- Ultimately, combining mathematical precision with a physics perspective can diagnose and improve the fairness of election algorithms, giving hope to millions participating in the 2024 elections worldwide.

CONCLUSION: The intersection of mathematics and physics in electoral processes reveals the complexity of fairness and representation. Historical perspectives, critiques of existing systems like FPTP, and the exploration of alternatives like Condorcet and Borda highlight ongoing challenges. By leveraging these disciplines, we strive for more equitable and democratic elections globally.



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INTERNATIONAL RELATIONS

Report Names Indian Official in Pannun Case

CONTEXT: The report by the Washington Post alleges that a former chief of India's Research and Analysis Wing (RAW), along with senior intelligence officials connected to Prime Minister Narendra Modi's inner circle, sanctioned a plot to kill Khalistani activist Gurpatwant Singh Pannun in New York, revealing international coordination and controversy surrounding India's intelligence operations.



BACKGROUND: US authorities suspect India's RAW agency planned to kill Sikh activist Pannun in the US. The Washington Post alleges former RAW chief Goel authorized it. A RAW officer named Yadav is reported to be involved. India denies the claims and says they're investigating. This comes amid reports of other RAW officers facing international scrutiny for actions against diaspora groups. These allegations have not been substantiated and has not been acknowledged by India.

ALLEGED ASSASSINATION PLOT OF SIKH ACTIVIST IN US

- **Accusation:** US authorities believe India's RAW agency planned to kill Sikh activist Gurpatwant Singh Pannun.
- The Washington Post Report:
- Names RAW official Vikram Yadav as allegedly involved.
- Claims former RAW chief Samant Goel authorized the operation.
- Suggests National Security Advisor Ajit Doval was likely aware.
- Indian Response:
- Denies the allegations and is investigating information shared by the US.
- Maintains such killings are not government policy.
- International Fallout:
- Other RAW officers reportedly face repercussions abroad.
- This may be due to increased scrutiny of RAW activities.

CONCLUSION: The allegations surrounding the alleged assassination plot of Sikh activist Gurpatwant Singh Pannun in the US, reportedly involving India's RAW agency and senior officials, highlight significant international tensions and the complexities of intelligence operations. With investigations ongoing and international fallout emerging, the situation underscores the importance of transparency and accountability in intelligence activities.

ECONOMICS

GDP Growth May Surpass 7% This Year, Says NCAER

CONTEXT: TThe National Council for Applied Economic Research (NCAER) predicts India's GDP growth may be higher than expected this year due to a positive monsoon forecast, improved global outlook, and strong domestic indicators.



INDIA'S GDP GROWTH FORECAST FOR 2024-25

- NCAER predicts higher growth than central bank estimate:
- The National Council for Applied Economic Research (NCAER) expects India's GDP growth to exceed the Reserve Bank of India's (RBI) projection of 7% for the current fiscal year (2024-25).
- Factors contributing to the optimistic outlook:
- Positive monsoon forecast: An above-normal monsoon is expected this year, which would benefit the agriculture sector, a key driver of the Indian economy.
- Improved global outlook: The International Monetary Fund (IMF) and World Trade Organization (WTO) have upgraded their forecasts for global growth and trade volumes in 2024 and 2025, creating a more favorable external environment for India.
- Strong domestic indicators: High-frequency indicators like GST collections and digital payments suggest continued economic resilience in March and April 2024.
- NCAER's conclusion:
- Based on these factors, NCAER believes the Indian economy can achieve growth rates exceeding 7% in 2024-25.

CONCLUSION: With a combination of favorable domestic and global conditions, NCAER anticipates India's economic growth to outperform the central bank's estimate for the year.



INTERNATIONAL RELATIONS

Canada Envoy Summoned Over Slogans in Public Meet

CONTEXT: The Ministry of External Affairs summoned the Canadian Deputy High Commissioner to protest pro-Khalistan slogans raised at an event attended by Canadian Prime Minister Justin Trudeau.

Pro-Khalistan Slogans at Public Meeting:

- The Ministry of External Affairs summoned the Canadian Deputy High Commissioner over pro-Khalistan slogans raised at an event attended by Canadian PM Justin Trudeau.
- The MEA lodged a strong protest against allowing such slogans to continue unchecked.

Trudeau's Comments and Poster Blaming Indian Leadership:

- Trudeau stated that Canada supports the Sikh community's right to religion without discrimination.
- A poster at the rally blamed Indian leadership for the murder of pro-Khalistan leader Hardeep Singh Nijjar in June 2023.

Indian Government's Response:

- The MEA conveyed deep concern about the event's disturbing actions.
- The protest coincided with revelations about an R&AW officer's alleged involvement in plotting the assassination of pro-Khalistan advocate Gurpatwant Singh Pannun.

CONCLUSION: The summoning of the Canadian Deputy High Commissioner and the Indian government's strong protest against pro-Khalistan slogans, combined with Trudeau's statements and allegations of Indian leadership's involvement in past incidents, underscore the heightened tensions and sensitivities surrounding Sikh activism and bilateral relations.

ECONOMICS

The Paradox of Thrift: Does a Rise in Savings Cause a Fall in Investment?

CONTEXT: The paradox of thrift explores the counterintuitive idea that increased individual savings might lead to a decrease in overall investment and economic growth.

THE PARADOX OF THRIFT: DOES SAVING HURT THE ECONOMY?

What is the Paradox of Thrift?

- Keynesian economists argue that an increase in individual savings can lead to a decrease in overall investment and economic growth.
- This is because if everyone saves more and spends less, there is less demand for goods and services.
- This can lead to businesses producing less and ultimately discourage investment.

Keynesian Perspective

• **Higher savings are bad for the economy:** When people save more, they spend less, which hurts businesses.

- Boost consumer spending for growth: By putting more money in consumers' pockets (through government spending for example), the economy can grow.
- Savings and Investment Connection: Savings are invested by capitalists, but without consumer demand for the resulting products, capitalists may be discouraged from further investment.

Criticisms of the Paradox

- **More Saving is Good:** Increased savings lead to more funds available for investment, not less.
- Savings Don't Disappear: Money not spent is saved and can be invested.
- **Investment Focus Shifts:** Lower consumer spending may lead to investment in long-term projects that were previously less attractive.
- Long-Term Growth: A larger pool of savings allows for investments in projects with longer timelines, contributing to economic growth in the long run.
- **Market Adaptation:** Critics argue that capitalists in a free market will adjust their investments based on consumer preferences, even with lower current demand for final goods.

CONCLUSION: The paradox of thrift presents a complex economic debate. While Keynesians argue that increased saving can stifle growth in the short term, critics point to the long-term benefits of a larger pool of investment capital. Ultimately, the impact of saving on investment likely depends on various factors, including the health of the overall economy, consumer confidence, and the ability of businesses to adapt their investments to changing consumer preferences.

POLITY AND GOVERNANCE

The Rising Share of Personal Income Tax And Indirect Tax is a Concern

CONTEXT: The recent election campaign in India saw a spotlight on social justice issues, with the Congress manifesto and Prime Minister Modi's responses creating a political stir. Concurrently, the Finance Ministry released tax data revealing trends in tax collections, highlighting shifts in the tax burden on different income groups and the changing dynamics of direct and indirect taxes in revenue composition.

Political Focus on Social Justice and Welfare:

- During the recent election campaign, the Congress party's manifesto emphasized social justice and welfare policies.
- Prime Minister Modi criticized Congress's demands for a caste census and land distribution plans, framing them as communal issues.
- Congress defended its manifesto, citing the need to address rising wealth inequality and denying favoritism towards any religious group.

Tax Data Release and Trends:

• The Finance Ministry released provisional data showing an increase in net tax collections, driven mainly by higher personal

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income tax and securities transaction tax collections.

- Net corporate tax collections experienced a slight decrease.
- Revenues from personal income tax and securities transaction tax grew nearly twice as fast as corporate tax revenues last year.

Analysis of Tax Trends:

- Chart 1 illustrates the declining share of corporate tax and the increasing share of personal income tax in gross tax revenue as of February 2024.
- The gap between income tax and corporate tax shares widened, with income tax now forming 28% of gross tax revenue.
- The drop in corporate tax can be attributed to significant tax cuts implemented in FY19 by the BJP-led government.

Direct vs. Indirect Taxes:

- Data show a decrease in the share of direct taxes (levied on incomes) and an increase in indirect taxes (such as excise duties and GST).
- Direct taxes are considered progressive, while indirect taxes are viewed as regressive since they apply uniformly regardless of income levels.

Income Tax Filers and Rates:

- Chart 3 indicates that a majority of personal income tax filers earn between ₹1 lakh to ₹5 lakh annually, with fewer high-income earners above ₹50 lakh.
- Compared to BRICS economies, India's effective personal income tax rate is among the highest (Chart 4).

Tax Burden Analysis:

 Overall, the data suggest that lower and middle-class citizens bear a larger tax burden due to the rising share of personal income tax and indirect taxes in total revenue.

CONCLUSION: The data presented highlights a concerning trend in India's tax system, where the burden on lower and middle-income groups is increasing due to the rising share of personal income tax and indirect taxes. This has significant implications for income distribution and calls for a balanced approach to taxation to ensure fairness and equity across all economic strata.

Taxing times

The data for the charts were sourced from the Centre for Monitoring Indian Economy, the Controller General of Accounts, and PricewaterhouseCoopers (PWC)



Chart 1: The chart shows corporate tax and personal income tax as a share of gross tax revenue, as of February every year

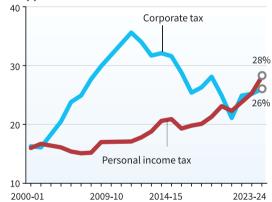


Chart 2: The chart shows the share of direct and indirect taxes in the combined tax revenue receipts of the Centre and the States across years

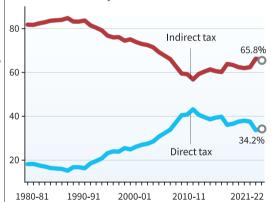


Chart 3: The chart shows the annual income bracketwise share in total income tax returns filed and the share in total amount of income tax paid

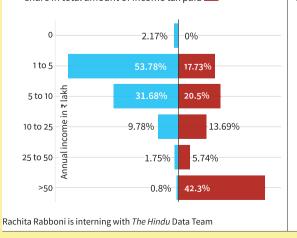
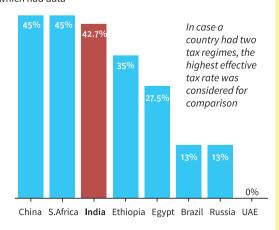


Chart 4: The chart compares the effective personal income tax rate in India with other BRICS countries which had data



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POLITY AND GOVERNANCE

The EVM-VVPAT Case Judgment is Disappointing

CONTEXT: The recent supreme court judgment on Voter verifiable Paper Audit Trail(VVPAT) in electronic voting machines has its critics who advocate for a more statistically sound audit system to ensure electoral integrity.

BACKGROUND: The recent Supreme Court judgment on Electronic Voting Machines (EVMs) and Voter Verifiable Paper Audit Trail (VVPAT), highlights concerns about the adequacy of the sample size for VVPAT-based audits and the need for a statistically sound system to detect discrepancies. It also critiques the Election Commission of India's (ECI) approach and advocates for a more robust audit protocol based on statistical principles.

EVM-VVPAT CASE JUDGMENT CRITIQUE

- Disappointment with Judgment:
- The recent Supreme Court judgment on EVM-VVPAT lacks a statistically robust approach, leading to concerns about the effectiveness of the audit system.
- Need for Statistical Soundness:
- India requires a VVPAT-based audit system with 99% or 99.9% accuracy in detecting mismatches, preferably conducted at the beginning of the counting day.
- · Historical Anecdote:
- Referring to an incident from 1897 about legislative attempts to define pi, highlighting the importance of scientific rigor in decision-making.
- Principles of Statistical Truth:
- Emphasizes that scientific truths cannot be established through arbitrary mandates but require adherence to statistical principles.
- VVPAT Audit as Lot Sampling:
- Describes the VVPAT audit as a form of lot acceptance sampling, where a specific number of defects determines acceptance or rejection of the entire population.
- Deficiencies in Sample Size and Protocol:
- Criticizes the lack of clarity in defining the population for sampling and the absence of clear protocols for handling defective EVMs.
- Probability of Detection Failure:
- Discusses statistical theory indicating high probabilities of failure to detect defective EVMs with the current sample size.
- Challenges in ECI's Claims:
- Challenges the Election Commission of India's claims of no mismatches, pointing out potential reasons for the few reported discrepancies.
- Court's Judgment Critique:
- Criticizes the Supreme Court's judgment for not addressing key issues related to sample size definition and audit protocols.
- Calls for Statistical Soundness:
- Advocates for a statistically sound VVPAT audit system with high accuracy rates, emphasizing the need for clarity and transparency in procedures.

CONCLUSION: The critique of the recent Supreme Court judgment on EVM-VVPAT underscores the pressing need for a more statistically sound audit system. The call for a VVPAT-based audit with higher accuracy rates, conducted at the beginning of the counting day, reflects a broader concern for electoral integrity and transparency. Moving forward, addressing the deficiencies in sample size definition and audit protocols is crucial to ensure a robust and trustworthy electoral process in India.

POLITY AND GOVERNANCE

Delhi Police Out; CISF Takes Over Parliament Security

CONTEXT: The recent transition of security responsibility at the Parliament complex in Delhi from the Delhi Police to the Central Industrial Security Force (CISF) following a security breach in December last year, alongside ongoing refurbishments and preparations for the new Lok Sabha composition.

BACKGROUND: In December 2023, a security breach at the new Indian Parliament building led to increased security measures. In response, CISF deployment is being increased to replace Delhi Police and Parliament Security Service personnel. This follows the in-principle approval for a more comprehensive security plan.

- 1. CISF Deployment and Security Breach Response:
- Around 400 CISF personnel deployed at Parliament complex after a security breach in December.
- Eight Delhi Police security personnel suspended post-breach.
- 2. Transition to CISF Security:
- 150 Delhi Police personnel withdrawn, CISF takes over security responsibilities.
- CISF expected to replace Parliament Security Service (PSS) under Lok Sabha Speaker.
- 3. Deployment Details and Training:
- CISF personnel training with PSS officials at Parliament complex.
- Phased deployment since January, focusing on access control areas.
- 4. Government Approval and Fire Safety:
- CISF accorded in-principle approval for comprehensive deployment by Union Ministry of Home Affairs.
- CISF's fire tenders replace Delhi Fire Service's at Parliament.
- 5. Refurbishment and Preparations:
- Parliament complex undergoing refurbishment ahead of new Lok Sabha composition in June.
- New arrangements for statues, infrastructure upgrades underway.

CONCLUSION: The transition of security responsibility at the Parliament complex from Delhi Police to CISF marks a significant step towards enhancing security measures following a breach. With CISF's deployment, training, and government approval for a comprehensive security plan, coupled with ongoing refurbishments, the Parliament complex is gearing up for a more secure and functional environment as the new Lok Sabha composition approaches in June.

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POLITY AND GOVERNANCE

The Poultry Industry Needs Urgent Reforms

CONTEXT: The outbreak of H5N1 with the unsafe conditions at industrial livestock production for more than 10 years now.

The H5N1 influenza virus, first identified in Hong Kong in 1997, has posed a significant threat to both animal and human health. In India, the first human case was reported in Maharashtra in 2006. A notable outbreak occurred in December 2020 and early 2021, affecting 15 states. The H5N1 influenza virus has shown the ability to cross species barriers, causing mortality among polar bears in the Arctic and seals and seagulls in Antarctica. According to the World Health Organization (WHO), the fatality rate for H5N1 in humans is estimated at 52 %, based on 463 deaths among the 888 diagnosed cases since 2003. Human infections are primarily linked to close contact with infected birds or contaminated environments.

Industrial poultry farming in India, particularly in units with more than 5,000 birds, has raised concerns about environmental pollution. These units, often using 'battery cages' that cram chickens in high densities, contribute to air pollution through odour, particulate matter, and greenhouse gas emissions. The Central Pollution Control Board (CPCB) has classified such units as polluting industries, requiring them to comply with regulations for establishment and operation. Failure to comply has led to closure notices being issued by the CPCB to some poultry industrial units.

Poultry farmers in India face challenges exiting the industry despite mounting debts and specialized skills. Market volatility and industry practices, such as the prophylactic use of antibiotics and growth promoters, contribute to their difficulties. Antibiotic use, driven by the demand for protein, is expected to increase, further complicating the situation for farmers. In India, antibiotics classified as critically important and highly important by the WHO are widely used in the poultry industry for preventative purposes. These antibiotics are often prescribed to day-old chicks to reduce the risk of disease and mortality, despite concerns about antibiotic resistance.

The intensive stocking of animals in unsanitary conditions has negative effects on animal welfare, food safety, and the health of workers and nearby residents. The emissions, effluents, and solid waste from these operations impact the environment, humans, and other animals. There is a pressing need for monitoring and enforcement of legal and regulatory measures to address these issues

The faecal matter from intensive animal farming is often collected by local farmers as fertilizer, but the volume exceeds the land's capacity, becoming a pollutant. This leads to crop damage and creates breeding grounds for disease-carrying flies. Residents resort to using insecticides, causing health issues and unpleasant odours.

Keeping animals in intensive confinement is considered a crime under the Prevention of Cruelty to Animals (PCA) Act, 1960. The operational practices at these facilities, such as mutilation, starvation, thirst, overcrowding, and other forms of ill-treatment, cause unnecessary pain and suffering to the animals, further violating the PCA Act.

Path to legal reform

The 269th Law Commission of India Report in 2017 highlighted the issue of non-therapeutic antibiotic use in poultry, leading to antibiotic resistance due to unhygienic living conditions. It

suggested that improved housing conditions could reduce the need for constant antibiotics, making poultry products safer for consumption. The report recommended draft rules for chicken welfare in the meat and egg industries, aligning with existing laws and international standards. These rules aimed to enhance animal welfare, thereby improving food safety.

The Draft Rules for the egg industry released by the Ministry of Agriculture and Farmers' Welfare in 2019 are considered weak and tokenistic compared to the recommendations of the Law Commission. There is a need for strict oversight to ensure compliance with environmental regulations, especially since the poultry industry has been reclassified as a highly polluting 'orange category' industry by the CPCB. Given the bird flu crisis and climate emergency, addressing these issues is crucial.

ENVIORNMENT

Why are unclassed forests 'missing'?

CONTEXT: The Union Ministry of Environment, Forests and Climate Change (MoEFCC) uploaded the various State Expert Committee (SEC) reports on its website earlier in April in compliance with February 19, 2024, Supreme Court order. This interim order was in response to a public interest litigation challenging the constitutionality of the Forest (Conservation) Act Amendment (FCAA) 2023.



What does the FCAA stipulate?

The enactment of the Forest Conservation Amendment Act (FCAA) could lead to the loss of legal protection for unclassed forests, which are currently protected under the T.N. Godavarman Thirumalpad case. The Supreme Court's order specified that all types of forests, including unclassed forests, would fall under the Forest (Conservation) Act, 1980. A project proponent seeks to divert unclassed forests for non-forest use, they would require approval from the Central government. Unclassed forests, also known as deemed forests, include lands belonging to various entities like forests, revenue, railways, communities, or private ownership, but have not been formally notified as forests.

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Have these forests been identified?

The status of the reports from the Supreme Court's Forest Conservation Amendment Act (FCAA) was unknown from 1996 until they gained attention again when the Ministry of Environment, Forest and Climate Change (MoEFCC) informed a Joint Parliamentary Committee that the State Expert Committees (SECs) had identified unclassed forests. This response came amidst criticism that the proposed law undermined the Godavarman judgment and would exclude all unclassed forest land from its purview. The MoEFCC assured the Committee that the amended Act would apply to the SEC-identified unclassed forests. However, in response to an RTI application, the MoEFCC stated that it did not have the necessary reports.

The Ministry of Environment, Forest and Climate Change (MoEFCC) has uploaded the State Expert Committee (SEC) reports on its website, revealing a concerning situation: no state has provided verifiable data on the identification, status, and location of unclassed forests. Seven states and Union Territories, including Goa, Haryana, Jammu & Kashmir, Ladakh, Lakshadweep, Tamil Nadu, and West Bengal, seem not to have constituted the SEC at all. Of the states that have shared their reports, only 17 out of 23 are in line with the directives of the Supreme Court.

What do the reports say?

Only nine states have provided information on the extent of unclassed forests. Most states and Union Territories have only shared the extent of different types of forest areas specified in the order, such as those under government ownership, either with forest or revenue, and in some cases under other government departments.

The State Expert Committee (SEC) reports indicate that almost no state or Union Territory specified the geographic locations of forests. Any geographical information provided is only for reserve or protected forests, which is not useful as this information is already

available with Forest Departments. The SEC reports also question the accuracy of the Forest Survey of India's reports, the only government agency responsible for surveying and assessing forests. For example, Gujarat's SEC report states that its unclassed forests cover 192.24 sq. km, while the Forest Survey has reported a significantly higher area of 4,577 sq. km (1995-1999).

The State Expert Committees (SECs) have not conducted on-ground verification, potentially leading to the large-scale destruction of forests that should have been identified, demarcated, and protected 27 years ago. The lack of baseline data from 1996-1997 makes it impossible to determine the extent of unclassed forests lost. For example, Kerala's SEC did not include the Pallivasal unreserve, an ecologically fragile area in Munnar that was devastated during the 2018 floods.

What would be the effects of FCAA?

The loss of unclassed forests is likely a widespread issue across all states and needs to be thoroughly investigated. The reports submitted to the Supreme Court appear to have been hastily compiled, using incomplete and unverified data from readily available records, to meet their obligations.

The Supreme Court's Godavarman order was intended to be implemented fully, but the failure to do so represents a missed opportunity to achieve the goals of the Indian Forest Policy, which aims for 33.3% forest cover in plains and 66.6% in hills. The enactment of the Forest Conservation Amendment Act (FCAA) without a thorough examination of the SEC reports shows a lack of diligence on the part of the Ministry of Environment, Forest and Climate Change (MoEFCC) and could have serious consequences for India's ecosystems and ecological security. Those responsible for this oversight should be held accountable, and the national government should take action to re-identify, retrieve, and protect forest areas as mandated by the 1996 judgment.





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