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MARCH 8



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# Over two-fold rise in breast cancer incidence in 30 years

Estimates show breast cancer incidence in India at 29.4 per 1,00,000 women in 2023; experts highlight gaps in access to treatment, calling for regular screening to ensure early detection

**Shrabana Chatterjee**  
KOLKATA

**T**he incidence of breast cancer in India has more than doubled over the past three decades, experts said at an international oncology conference in Kolkata on Friday, while warning that gaps in access to treatment continue to affect many patients.

Experts participating in the India edition of the St. Gallen International Breast Cancer Conference said there was a steady increase in breast cancer cases in the country. Estimated data shared at the conference suggested that the incidence had increased from 13 per 1,00,000 women in 1990 to 29.4 in 2023.

Medical professionals agreed that active screening and raising awareness have helped detect more cases, but they feared that various other factors are also contributing to the rise.

Doctors said lifestyle changes, lack of breastfeeding, alcohol consumption, tobacco usage, and sedentary work could be contributing factors behind the rise in breast can-

## Rising incidence

Experts highlight a steady rise in breast cancer cases in India, indicating a growing public health concern

**1990:**  
13 cases  
per 1,00,000  
women

**2023:**  
29.4 cases  
per 1,00,000  
women

### Key factors contributing to increase

- Lifestyle changes
- Lack of breastfeeding
- Alcohol consumption
- Tobacco use
- Sedentary work patterns



cer in people. Though women are at a higher risk of getting affected by breast cancer, it is to be noted that even men can get breast cancer, and regular screening of both genders for breast cancer is crucial to detect the problem at an early stage.

"We know that geographical and economic factors should not be a barrier for breast cancer treatment, but unfortunately, till today, many people cannot get adequate care due to lack of resources," Soumen Das, director of the Institute of Breast Diseases, Kolkata, told *The Hindu*.

He added that their institute's research was focused on these implemen-

tation areas so that all cancer drugs that are available in the global market should also be made available in the remotest areas.

Dr. Das, who heads the Institute of Breast Diseases and is one of the event organisers, said that a treatment and drug which is not widely accessible to people across communities is not very helpful, and to mitigate this crisis, they have taken steps like making better use of government schemes and giving temporary employment to relatives or caregiver of the patient near the hospital. "We have seen an immense positive response due to this initiative. When the close relative is given temporary employment

near or inside the hospital, the treatment completion rate increases," Dr. Das said.

Meanwhile, highlighting the importance of multi-disciplinary care, Prof. Jens Hoesler, St. Gallen, Switzerland, said, "Advances in breast cancer treatment require close collaboration between surgery, radiation oncology, and systemic therapies. Global dialogue accelerates progress for patients everywhere."

Other researchers and doctors at the conference also stressed the need to ensure that breast cancer treatment and care reaches people across all sections of society in order to make a large-scale impact.

Five young investigators were selected to present their work at the next St. Gallen International Breast Cancer Conference scheduled to be held in Vienna in 2027.

The conference also launched the Project Pink Army, a community-driven volunteer movement aimed at mobilising the community to drive cancer awareness and build better patient support systems.



- **Key Terms and Explanations**

- **Incidence Rate:** The number of new cases of a disease that occur in a specific population during a defined period. In this context, it rose from 13 to 29.4 per 100,000 women.

- **Oncology:** The branch of medicine dedicated to the prevention, diagnosis, and treatment of cancer.

- **Multidisciplinary Care:** An integrated approach where specialists from different fields (surgeons, radiologists, oncologists) collaborate to create a single treatment plan.

- **Systemic Therapy:** Treatment using substances that travel through the bloodstream, reaching cells throughout the body (e.g., chemotherapy or hormone therapy).

- **Active Screening:** Proactive testing of asymptomatic individuals to detect the disease at an early, more treatable stage (e.g., Mammography or Clinical Breast Examination).



- **Main Arguments and Substantive Parts**

- **The Burden of Disease:** The core thesis is that India is facing a "cancer transition." As communicable diseases are managed, non-communicable diseases (NCDs) like breast cancer are surging due to demographic and lifestyle shifts.

- **The "Access Gap":** While medical science has advanced, the "last-mile delivery" remains broken. Geography and economics act as filters, often excluding rural and low-income populations from life-saving drugs.

- **The Lifestyle Link:** Experts argue that urbanization has brought "modern" risks: delayed childbearing, reduced breastfeeding durations, high-calorie sedentary lifestyles, and increased tobacco/alcohol use.

- **Social Innovation in Healthcare:** A significant point raised is the need for "wraparound" services—like providing employment to caregivers—to ensure patients don't drop out of long-term treatment due to financial exhaustion.



- **Historical Evolution of the Issue**
- **Pre-1990s (Low Visibility):** Cancer was often overshadowed by infectious diseases (Malaria, TB). Reporting was poor, and the incidence was relatively low (approx. 13 per 100,000).
- **1975 (National Cancer Control Programme):** Launched to provide treatment facilities. In 1984-85, the focus shifted to primary prevention and early detection.
- **2010 (NPCDCS):** The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke was launched to integrate NCD interventions into the NRHM (National Rural Health Mission) framework.
- **Present Day (Ayushman Bharat Era):** Transition toward tertiary care coverage (PM-JAY) and the establishment of Health and Wellness Centres (HWCs) for community-level screening.

# Breast Cancer in India: The Epidemiological Transition & Policy Roadmap

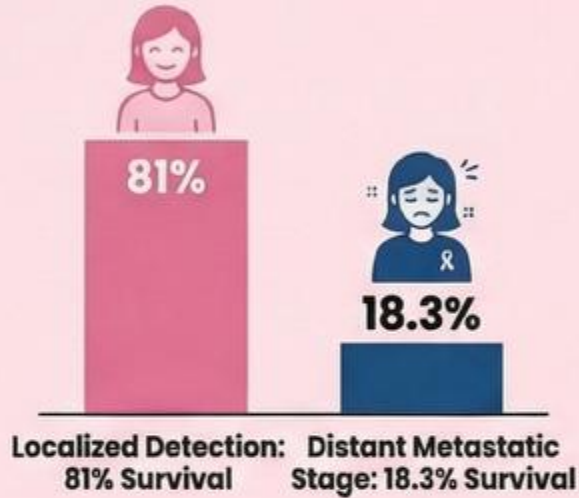
## THE CRISIS OF THE "ACCESS GAP"

**13 to 29.4**  
per 100,000 Women

The incidence rate has more than doubled since 1990 due to urbanization and lifestyle shifts.

### The 18.3% vs. 81% Survival Paradox

Survival drops significantly when diagnosed at a distant metastatic stage compared to localized detection.



## THE GOVERNANCE & INNOVATION ROADMAP

### Hub-and-Spoke Oncology Model



**Integrated Screening Framework:** Utilizing Ayushman Arogya Mandirs for community-level screening (CBE) linked to tertiary PM-JAY coverage.



### DEMOGRAPHIC & CLINICAL SHIFT: INDIA VS. WEST



### Economic Toxicity & The Access Gap

Out-of-pocket expenditure often pushes middle-class families below the poverty line despite medical advancements.

	INDIAN CONTEXT	WESTERN CONTEXT
Peak Age of Onset	40-50 Years (A decade earlier)	50-60 Years
Stage at Diagnosis	Predominantly Late-Stage	Predominantly Early-Stage
Subtype Prevalence	Higher Triple-Negative (Aggressive)	Higher Hormone-Receptive

### The "Caregiver Employment" Model



Hiring patient relatives within hospital ecosystems to mitigate wage loss and reduce treatment dropout.



### Distributive Justice (Rawlsian View)

Equal access to healthcare services regardless of location. Survival should not depend on the "lottery of birth" or geographic location.

## Linkages with NCERTs

**Class 12 Biology (Human Health and Disease):** Concepts of cancer, contact inhibition, and metastasis.

**Class 11 Sociology (Structure, Process and Change):** Impact of urbanization and lifestyle changes on traditional societal health patterns.

**Class 12 Economics (Indian Economy):** Human Capital formation and the role of health infrastructure.

## Previous Years' UPSC Questions

**Mains (GS II, 2018):**  
"Appropriate local community-level healthcare intervention is a prerequisite to achieve 'Health for All' in India. Explain."

**Mains (GS III, 2017):** "Can the strategy of regional resource-based manufacturing help in promoting employment? (Link to caregiver employment idea)."

**Mains (GS II, 2021):** "Public health system has limitations in providing preventive and promotive healthcare. Examine."

# Consider abdominal obesity a vital sign in Asian Indians: study

**The Hindu Bureau**  
CHENNAI

Experts in India are calling for abdominal obesity to be recognised as a new vital sign in Asian Indians. An editorial by Amerta Ghosh and Anoop Misra published in the journal *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, has emphasised the necessity of measuring waist circumference in all patients.

## Metabolic crisis

The progressive increase in obesity and abdominal obesity in India represents a significant and evolving metabolic crisis contributing to the rising prevalence of conditions such as type 2 diabetes, cardiovascular disease, metabolic dysfunction-associated steatotic liver disease (MASLD) and associated cardiometabolic disorders, the editorial noted.

Asian Indians characteristically develop abdominal obesity despite relatively normal Body Mass Index (BMI), a phenotype associated with higher insulin resistance, ectopic fat deposition, and earlier onset of metabolic diseases.

BMI, therefore, is an inadequate measure of obes-

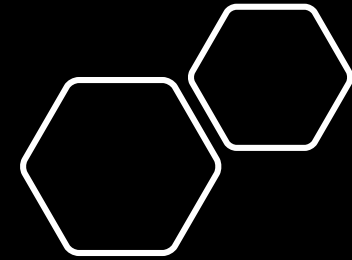


Asian Indians characteristically develop abdominal obesity despite relatively normal BMI.

ity, it states, calling for a shift in focus from generalised obesity to abdominal obesity, from a reliance on BMI to prioritising waist circumference and related indices, including waist circumference-to-height ratio for more accurate cardiometabolic risk stratification in routine clinical practice.

Data from the National Family Health Survey-5 revealed that abdominal obesity affects approximately 40% of women and 12% of men.

Significantly, abdominal obesity is no longer confined to urban or affluent populations, it is rising in rural areas and increasingly affecting lower and middle socioeconomic groups, the editorial highlighted.





- **Key Terms and Explanations**

- **Abdominal Obesity:** Also known as visceral or central obesity, it refers to the excessive accumulation of fat around the stomach and abdomen. Unlike subcutaneous fat (under the skin), visceral fat wraps around internal organs.


- **Body Mass Index (BMI):** A value derived from the mass and height of a person ( $BMI = \text{weight in kg} / \text{height in m}$ ). While globally standard, it fails to distinguish between muscle and fat distribution.

- **Metabolic Syndrome:** A cluster of conditions—increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol levels—that occur together, increasing the risk of heart disease and stroke.

- **MASLD (Metabolic Dysfunction-Associated Steatotic Liver Disease):** Formerly known as NAFLD, this refers to liver inflammation caused by fat buildup, closely linked to obesity and insulin resistance.

- **Ectopic Fat Deposition:** The storage of triglycerides in tissues other than adipose tissue, such as the liver, skeletal muscle, and pancreas, which directly interferes with cellular function.

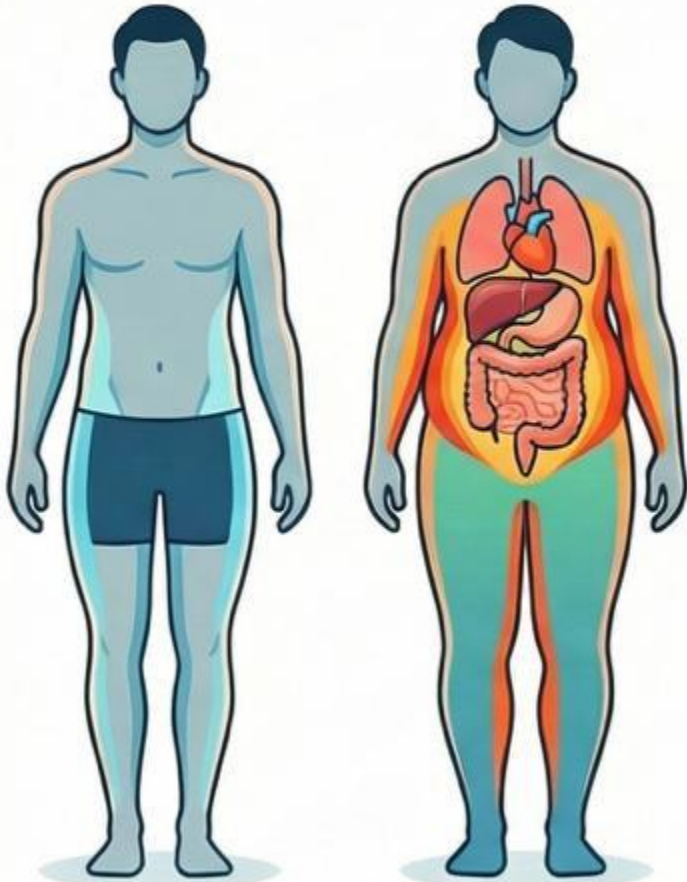
- **Insulin Resistance:** A condition where cells in the muscles, fat, and liver don't respond well to insulin and can't easily take up glucose from the blood.

- 
- **Main Arguments and Substantive Parts**
  - The core thesis posits that **Waist Circumference (WC)** should be elevated to a "vital sign," equal in importance to blood pressure or heart rate.
  - **The Inadequacy of BMI:** The Indian phenotype often presents with a low BMI but high body fat percentage. Relying on BMI alone leads to "under-diagnosis" of metabolic risks.
  - **The "Asian Indian Phenotype":** This refers to a specific genetic and environmental predisposition characterized by higher abdominal fat, lower muscle mass, and higher levels of inflammation even at lower weights.
  - **Epidemiological Shift:** Data (NFHS-5) shows a staggering gender disparity (40% of women vs. 12% of men) and a "rural-urban blur," where sedentary lifestyles and ultra-processed foods are penetrating rural markets.
  - **Ectopic Fat as a Driver:** The argument highlights that abdominal fat isn't just "storage"; it is an active endocrine organ secreting pro-inflammatory cytokines that cause systemic disease.

- **Historical Evolution of the Issue**
- **Pre-Independence/Early Post-Independence:** India faced the "epidemic of scarcity." Policy focus was entirely on undernutrition and infectious diseases (e.g., TB, Malaria).
- **1990s (The Great Transition):** Economic liberalization led to rapid urbanization, changes in dietary patterns (the "Nutrition Transition"), and reduced physical labor.
- **Early 2000s:** The "WHO Western Pacific Region" guidelines first suggested lower BMI cut-offs for Asians ( $23 \text{ kg/m}^2$  instead of  $25 \text{ kg/m}^2$ ), acknowledging the unique Asian risk profile.
- **Present Day:** India is now the "Diabetes Capital of the World." The focus has shifted from "Food Security" to "Nutrition Security," with the NFHS-5 highlighting the "Double Burden of Malnutrition" (stunting and obesity co-existing).

# The "Thin-Fat" Indian Paradox: Why Waist Circumference is the New Vital Sign

## THE PROBLEM: THE INADEQUACY OF BMI FOR INDIANS



Standard BMI Body

Asian Indian Phenotype  
Normal BMI, High Visceral Fat & Insulin Resistance:  
Under-diagnosed metabolic risks

### KEY FINDING: The "Thin-Fat" Paradox



Indians often have a normal BMI but high body fat and insulin resistance, leading to massive under-diagnosis.

### Staggering Gender Disparity



Abdominal obesity affects 40% of Indian women

Only 12% of Indian men affected (NFHS-5 data)

### DEFINITION: Visceral vs. Subcutaneous Fat

Subcutaneous Fat: Under skin, less harmful



Visceral Fat: Wraps around organs, active endocrine organ triggering systemic inflammation

## THE SOLUTION: RE-DEFINING HEALTH METRICS



### WAIST CIRCUMFERENCE: The New Vital Sign

Elevate waist measurement to vital sign status for early diabetes & heart disease detection at zero cost.

### EXAMPLE: The "Half-Height" Rule (WHtR)



Waist Circumference < Half of Total Height

A simple, effective rule of thumb for Indians.


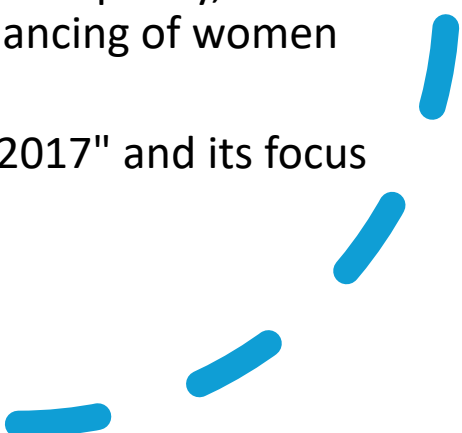
### SUPPORTING FACT: Economic & Policy Sustainability



Early screening with a simple tape measure can mitigate the estimated \$4.58 trillion economic drain caused by NCDs in India.

### COMPARING THRESHOLDS: GLOBAL VS. ASIAN INDIAN

Global (WHO) Standard	Asian Indian Threshold
BMI (Overweight): 25.0 kg/m <sup>2</sup>	BMI (Overweight): 23.0 kg/m <sup>2</sup>
BMI (Obese): 30.0 kg/m <sup>2</sup>	BMI (Obese): 25.0 kg/m <sup>2</sup>
Waist Circumference: Varies	Waist Circumference: Men: ≥80 cm Women: ≥80 cm

- 
- **Linkages with NCERTs**
  - **Class 12 Biology:** *Human Health and Diseases* (Concept of metabolic disorders and lifestyle diseases).
  - **Class 9/10 Science:** *Why do we fall ill?* and *Life Processes* (Understanding nutrition and the role of the endocrine system).
  - **Class 11 Geography:** *India: Physical Environment* (Can be linked to changing agricultural patterns and the availability of diverse food crops).
- 
- **Previous Years' UPSC Questions**
  - **Mains 2023 (GS 2):** "The critical gap in public health infrastructure in India is not just the number of facilities, but the quality of care." (Relate to diagnostic tools like WC).
  - **Mains 2021 (GS 2):** "Can the vicious cycle of gender inequality, poverty, and malnutrition be broken through microfinancing of women SHGs?" (Relate to the 40% prevalence in women).
  - **Prelims 2017:** Question on "National Health Policy 2017" and its focus on NCDs.
- 

# U.P. accounts for most cases of denial of access to public spaces to persons from SC communities

**Abhinay Lakshman**  
NEW DELHI

Reported cases of denial of access to public spaces to persons from the Scheduled Caste communities – a crime category that was introduced by the National Crime Records Bureau in 2017 – have been rising across India since authorities started recording them, with Uttar Pradesh holding a large share.

As per the NCRB's 2023 Crime in India report, there were 180 reported cases of SCs being denied access to public spaces under the SC/ST (Prevention of Atrocities) Act across the

## Crime chart

Reported cases of denial of access to public spaces to persons from SC communities



Year	Total cases (India)	Cases in U.P.	U.P. share (%)
2017	12	0	0%
2018	16	11	68%
2019	26	21	80%
2022	305	300	98.3%
2023	180	173	96.1%

country. Of these, 173 were reported in U.P. alone, The remaining incidents were reported from Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, and Rajasthan.

The NCRB's data for the year before, showed that the country reported 305 of such cases out of which 300 were from U.P. In 2018, the State accounted for 68% of such cases all

over India, which rose to 80% in 2019.

### For better classification

Ish Kumar, former Director-General of the NCRB, told *The Hindu* that in 2017, the organisation introduced new columns to "better classify" crimes across India. As a result, new crime heads and classifications were added in the Crime in India reports. The category of crimes under the SC/ST Act – 'Prevent or deny or obstruct usage of public place/passage' – was among the new crime-heads that were added to the series as part of this reform.

In the first year that this crime category was introduced, it noted just 12 cases across the country, spread across States like Himachal Pradesh, Punjab, Karnataka, Kerala, and Maharashtra, while U.P. reported zero. However, U.P. did record 57 cases that year under another newly added category: SC persons being forced to leave their residence or facing social boycott.

Interestingly, a review of this crime category data showed that the number of such cases reported was relatively lower for people belonging to Scheduled Tribe communities.

- **Key Terms and Explanations**

- **Scheduled Castes (SC):** Groups of historically disadvantaged people in India who are given explicit recognition in the Constitution. They were previously subjected to the practice of "untouchability."

- **National Crime Records Bureau (NCRB):** An Indian government agency responsible for collecting and analyzing crime data as defined by the Indian Penal Code (IPC) and Special and Local Laws (SLL).

- **SC/ST (Prevention of Atrocities) Act, 1989:** A specialized law enacted to prevent offenses and atrocities against members of Scheduled Castes and Scheduled Tribes, providing for special courts and relief for victims.

- **Denial of Access to Public Spaces:** A specific crime category under the SC/ST Act where individuals are prevented from using public roads, water bodies, wells, crematoriums, or places of worship based on their caste identity.

- **Social Boycott:** A collective refusal by a dominant group to engage in social or commercial relations with a specific community, often used as a tool of coercion against SC/ST members.

- **Main Arguments and Substantive Parts**

- The core thesis of the data suggests a significant concentration of reported "denial of access" crimes in Uttar Pradesh, reflecting either a higher incidence of the crime or a more robust reporting mechanism following administrative reforms.

- **Statistical Dominance of U.P.:** In recent years, Uttar Pradesh has accounted for the vast majority of these cases (e.g., 173 out of 180 in 2023). This represents a shift from 2017, when U.P. reported zero cases in this specific sub-category.

- **Impact of Classification Reforms:** The 2017 reform by the NCRB introduced "new crime heads." This allowed for more granular data collection. The spike in U.P.'s numbers suggests that previously "hidden" crimes are now being correctly categorized under specific sections of the SC/ST Act.

- **Disparity between SC and ST Reporting:** The data indicates that Scheduled Tribes report fewer instances of denial of public access compared to Scheduled Castes, likely due to different geographical distributions and the nature of tribal social structures versus the caste-based hierarchy in plains.

- **Temporal Trends:** The percentage of cases contributed by U.P. rose from 68% in 2018 to 80% in 2019, indicating a sustained pattern of reporting within the state compared to the rest of the country.



- **Historical Evolution of the Issue**

- **Pre-Independence:** The struggle against "untouchability" led by B.R. Ambedkar and Mahatma Gandhi. The Mahad Satyagraha (1927) was a seminal event specifically targeting the denial of access to public water sources.

- **Post-Independence (1950):** Article 17 of the Constitution formally abolished untouchability. Article 15(2) specifically prohibited discrimination regarding access to shops, public restaurants, hotels, and places of public entertainment.

- **Untouchability (Offences) Act, 1955:** The first major legislative attempt to penalize these acts, later renamed the **Protection of Civil Rights Act**.

- **SC/ST (Prevention of Atrocities) Act, 1989:** Shifted the focus from mere "civil rights" to "prevention of atrocities," recognizing that social discrimination often manifests as violent or coercive exclusion.

- **2017 NCRB Reform:** The introduction of specific sub-headings for "denial of access," transitioning from aggregate data to targeted data points.

# Caste-Based Denial of Access: Bridging the Gap Between Law and Reality

## The Act of Exclusion



## The Act of Exclusion

Despite constitutional protections, SC communities continue to face denial of access to public resources.

## THE FRAMEWORK OF JUSTICE: RIGHTS VS. REALITY

### Constitutional Safeguards (Articles 15 & 17)

Article 17 abolished untouchability; Article 15(2) guarantees equal access to shops, restaurants, and public wells.



### The SC/ST Atrocities Act, 1989

A specialized law that criminalizes specific acts like 'social boycott' and denial of passage.



Constitution (Dignity & Fraternity)

Inherited Caste Prejudices (Social Morality)

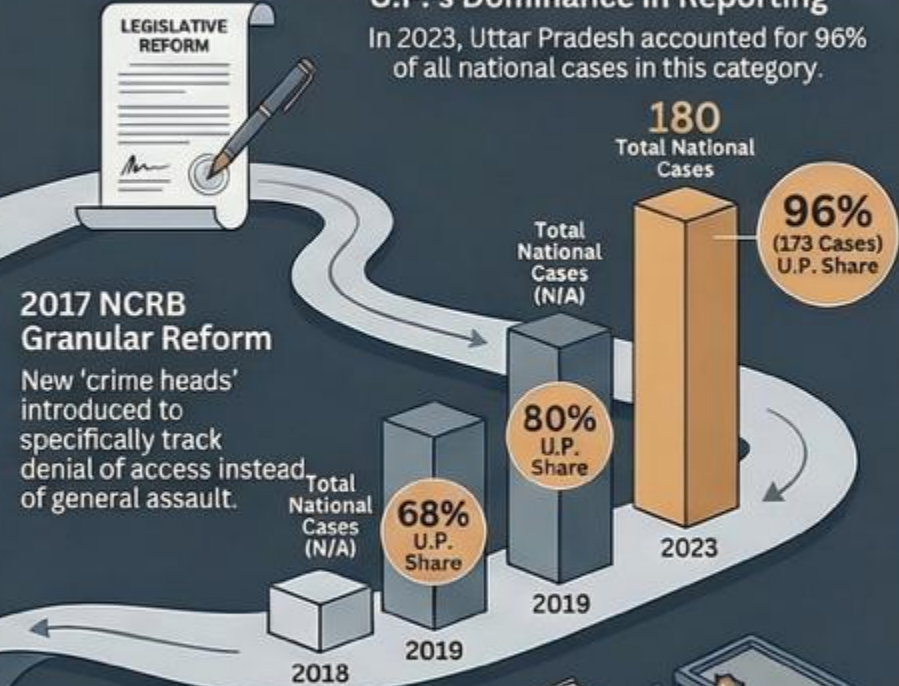
### Constitutional vs. Social Morality

The struggle to replace inherited caste prejudices with democratic values of dignity and fraternity.

## DATA TRENDS & THE 'UTTAR PRADESH' FACTOR

### U.P.'s Dominance in Reporting

In 2023, Uttar Pradesh accounted for 96% of all national cases in this category.



### 2017 NCRB Granular Reform

New 'crime heads' introduced to specifically track denial of access instead of general assault.



### The Agency Paradox

Higher numbers may reflect increased legal literacy and trust in police rather than higher crime.





- **Linkages with NCERTs**
- **Class 11 Political Science (Indian Constitution at Work):** Chapter on *Fundamental Rights* (Articles 15, 17).
- **Class 12 Sociology (Social Institutions: Continuity and Change):** Discussion on the Caste System and the struggles of the Dalits.
- **Class 8 Social and Political Life III:** Chapter on *Marginalisation* and *Confronting Marginalisation*.
  
- **Previous Years' UPSC Questions (PYQs)**
- **Mains (GS 2, 2020):** "Has the Caste System lost its relevance in understanding the multi-cultural Indian Society? Elaborate your answer with illustrations."
- **Mains (GS 1, 2017):** "The caste system is assuming new identities and associational forms. Hence, caste system cannot be eradicated in India. Comment."
- **Mains (GS 2, 2018):** "Whether the Supreme Court Judgment (March 2018) on the SC/ST Act diluted the provisions of the Act? Discuss its impact."

# 'Collective action needed to address climate change'

**Vinaya Deshpande Pandit**  
MUMBAI

Climate change is a global problem, but many of the solutions are going to be local, Finland President Alexander Stubb said in Mumbai on Saturday, emphasising the need for collective action to address the issue.

He was speaking to college students at the University of Mumbai campus after delivering an address on "Rebalancing the new world order: multilateral cooperation in the age of fragmentation". "We need to set global standards and levels, and then try to invest in technologies so that there will be innovations to lead towards a more sustainable system. The truth is that our consumption of energy is not going to go down. So, the question is, how can we generate clean energy?" he said.

Speaking about Finland's clean energy strategy, he said the country had started investing in renewable energy, nuclear energy and hydro-energy sever-



Mukesh Ambani and Anant Ambani hosted Alexander Stubb, at their home in Mumbai on Saturday. MUMBAI UNIVERSITY

al years ago. Mr. Stubb spoke about the current global order, adding that the current churn and a multipolar order should lead to a multilateral world. "The Global South has a big role to play in it," he said.

Addressing the students, Mr. Stubb said, "Dream, believe, work hard and succeed. Dream is something all of us should have. You should dream big. Realise that not all those dreams will be fulfilled. But don't let anyone tell you, it is not possible."

Encouraging students to work hard, he said being uncomfortable and

pushed to the limits was not necessarily "a bad thing".

Defining success as creating meaning in life, he said it was important to do something that had an impact.

"By success, I do not mean societal status or a title. I do not mean wealth. For me – and especially for all you students – success is defined by meaning. Meaning comes from the fact that you do something in your day-to-day life which has an impact, which you believe is important. That will lead to a happy life. But don't be too hard on yourself," he said.



- **Key Terms and Explanations**

- **Multilateralism:** A process where multiple countries work together on a given issue to achieve a common goal. Unlike bilateralism (two countries), this involves global institutions like the UN or WTO.

- *Example:* The Paris Agreement on Climate Change.

- **Multipolar Order:** A distribution of power in which more than two nation-states have nearly equal amounts of military, cultural, and economic influence.

- *Context:* The shift from a US-dominated (unipolar) world to one where India, China, and the EU play major roles.

- **Global South:** A term used to describe developing, emerging, or lower-income nations, primarily located in Africa, Asia, and Latin America.

- **Fragmentation:** In international relations, this refers to the breaking down of global cooperation into competing blocs or isolated regional interests.

- **Clean Energy Strategy:** A long-term policy framework to shift a nation's energy mix from fossil fuels to carbon-neutral sources (Nuclear, Hydro, Solar, Wind).

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- **Main Arguments and Substantive Parts**

- The discourse centers on three primary pillars:

- **The Paradox of Climate Solutions:** While climate change is a "Global Commons" problem, the implementation of solutions must be **local**. Global standards are necessary, but innovation happens at the grassroots and national levels.

- **The Energy Consumption Reality:** A significant argument made is that global energy demand **will not decrease**. Therefore, the "Green Transition" shouldn't focus on austerity (using less) but on **decoupling** growth from carbon by scaling clean generation.

- **Rebalancing the World Order:** The current "age of fragmentation" requires a move toward a multilateral world where the **Global South** acts as a bridge-builder rather than a bystander.

- **Redefining Success:** A philosophical shift is proposed where success is measured by "**Meaning**" (**Impact**) rather than "Status" (Wealth/Titles).

- 
- **Historical Evolution of the Issue**
  - **Post-WWII (1945):** Establishment of the Bretton Woods system and the UN; birth of early multilateralism.
  - **1970s-80s:** The rise of environmental consciousness (Stockholm Conference 1972) and the emergence of the "North-South" divide in climate responsibilities.
  - **Post-Cold War (1990s):** Unipolarity (USA) and the acceleration of globalization.
  - **2015 (The Turning Point):** Adoption of the SDGs and the Paris Agreement, formalizing "Common but Differentiated Responsibilities" (CBDR).
  - **Present Day:** Shift toward a multipolar world characterized by "minilateralism" (Quad, BRICS+) and a renewed focus on the Global South's leadership (e.g., India's G20 Presidency).

# The Triple Transition: A Global Roadmap for Future Leaders

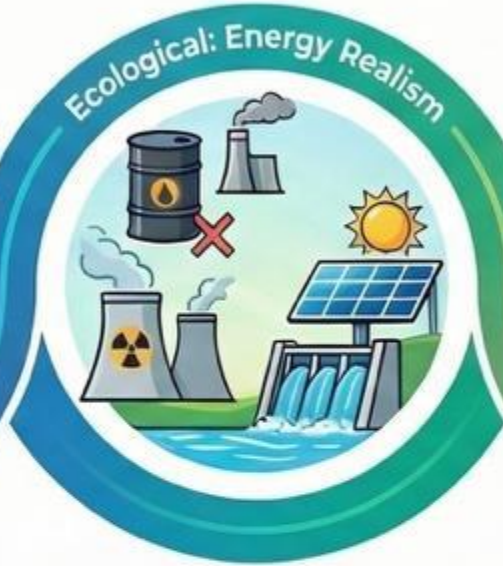
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## THE THREE PILLARS OF TRANSITION

**Geopolitical: From Unipolar to Multipolar**  
Power is shifting from US-dominance to a world where India and the Global South act as bridge-builders.



Power is shifting from US-dominance to a world where India and the Global South act as bridge-builders.



**Individual: Redefining Success**

A philosophical shift measuring success by "Meaning" and "Impact" rather than "Wealth" or "Status".



A philosophical shift measuring success by "Meaning" and "Impact" rather than "Wealth" or "Status".

## THE CLIMATE GOVERNANCE PARADOX



### Global Standards vs. Local Solutions



While climate targets are set globally, innovation and implementation happen at the grassroots level.



### Climate Justice & Equity

Ensuring the Global North pays its "Carbon Debt" while the Global South leapfrogs to clean technology.



### The "New Normal" Crisis

Extreme weather events occurred on nearly 99% of days in 2025, demanding pre-disaster resilience planning.

## INDIA'S STRATEGIC SHIFT

(comparing India's shifts in climate and political order)

### Geopolitics

Historical Context: Unipolar/Bilateralism



Future Strategic Role: Multipolar/Strategic Autonomy



### Climate Action

Historical Context: Defensive/North-South Divide



Future Strategic Role: Global Leadership (e.g., International Solar Alliance)



### Philosophy

Historical Context: Growth-at-any-cost



Future Strategic Role: Sustainable Development & "Vishwa Mitra"



- **Linkages with NCERTs**
- **Class 12 Political Science (Contemporary World Politics):** Chapters on "International Organisations" and "Environment and Natural Resources."
- **Class 11 Economics (Indian Economic Development):** Chapter on "Sustainable Development."
- **Class 10 Geography:** Chapter on "Energy Resources."

# What is the state of the environment in India?

What does the Centre for Science and Environment's report for 2025 say about pressing challenges?

Shikha M. Bhatn

**The story so far**  
On February 28, the Delhi-based Centre for Science and Environment (CSE) released the 'State of India's Environment 2025', a report that the researchers and scientists more greatly than before established since 2012. The report gives a bird's-eye view of the environmental challenges the country faces, ranging from floods, extreme weather events, changes in tiger behaviour, and air pollution. It also gives a global perspective of climate change and connects it to the Indian context.

**Are extreme weather events increasing?**  
The report says that in 2025, India experienced the highest rise in both the frequency and severity of extreme weather events over the past four years, including heatwaves, cold waves, heavy rainfall, and floods. Data from January 8 to November 22, 2025, shows that such events were recorded on 99% of the days in 2025, resulting in 4,419 reported deaths and affecting at least 17.41 million hectares of crop area. This is a sharp rise from 2024, when extreme weather events accounted for 88% of days, causing 3,003 deaths and impacting 1.01 million ha of crop area. In 2023, 89% of days experienced such events, resulting in 3,248 deaths and 2.04 million ha of crop damage.

Financial trends show the worst hit by extreme weather events (EW) states, followed by loss in GDP days, and Madhya Pradesh (102 days). "Takes together, these trends signal a 'sobering' ecological backlash and underscore the urgency of meaningful climate action. Without decisive steps to cut risks and emissions, the numbers we face today are becoming the new normal," the report said.

**Are floods increasing every year?**  
The report talks about how a warming climate will substantially increase the possibility of widespread floods. It says, "Climate change is not a distant possibility; it is already shaping our rivers, our cities, and our lives. Future resilience will depend on how quickly we can integrate climate science into everyday planning — from how we design cities to how we allocate land and water." It says India's rapidly growing river basin population rather than its low-density population. The report says that the need for water-based solutions such as restoring wetlands, conserving rivers in their basins, recharging groundwater, intervening upstream, and restoring and constructing lakes.

**In tiger behaviour a change?**  
The report notes that tigers in six reserves in tiger habitat districts, from January to June 2025, at least 43 tiger were killed near tiger reserves, with tiger conservation areas of tiger victims in four cases. In the same period in 2024, 44 tigers lost their lives to tiger attacks. "Tiger safety data into complete habitat areas, but tiger attacks and conservation of habitats increase when the wild can move and no other tiger habitat and are available to them for food, as well as their natural prey base disappears. According to experts and wildlife scientists, says the report, one of the reasons why tiger seem to be increasingly suggesting habitats is proximity of habitats to tiger territory."

CSE notes that both the tiger population and the number of people living near tiger reserves are on the rise. In 2025, tiger population, around 40% of tiger territory overlaps with land that is 60 million people. Tiger population and tiger reserves areas are in a natural state. As a result, the tiger are increasingly becoming fragmented areas. Experts said in the report that the climate-induced changes in tiger habitat, loss of habitat, and tiger activity near tiger habitats.

**In India population and quality of life?**  
As per CSE's analysis, only 15% of India's population (about 200 million people) live within 40 kilometres of a coastline and quality of life. The remaining 85%, across 8.2 billion people live in areas in remote and mountainous regions. Air quality remains poor in a third of large cities, particularly in the capital and metropolitan regions. "Tiger attacks, industrial fires and fast-growing port carbon footprints indicate the environmental risk. The world is a fragmented state: a few cities with clean, comfortable air quality and well-managed urban systems that support health." It says, "This absence is not just a gap in infrastructure, but the absence of the kind of investment in India's environmental governance. Hundreds of smaller towns, many of which are becoming unmanageable in terms of levels of air pollution due to local industrial and transport activities, have no real-time data on air, according to the report."

- **Key Terms and Explanations**

- **Extreme Weather Events (EWEs):** Unpredictable and severe weather occurrences—such as heatwaves, cloudbursts, and cold waves—that deviate significantly from historical patterns. *Example: 99% of days in 2025 recording an EWE indicates these are no longer "rare."*

- **Nature-Based Solutions (NbS):** Actions to protect, sustainably manage, and restore natural or modified ecosystems to address societal challenges. *Example: Using mangroves to buffer against storm surges instead of building concrete sea walls.*

- **Continuous Ambient Air Quality Monitoring System (CAAQMS):** Automated systems that provide real-time data on pollutants like PM<sub>2.5</sub> and PM<sub>10</sub>.

- **Ecological Backlash:** A counter-reaction by the environment to human interference, often resulting in disasters that surpass human capacity to manage.

- **Peri-urban Belts:** Transition zones between rural and urban areas. These are often regulatory "gray zones" where industrial activity spikes without adequate environmental monitoring.

- **Human-Wildlife Conflict (HWC):** Interactions between humans and wildlife that result in negative impacts on people, animals, resources, or the habitat.



- **Main Arguments and Substantive Parts**

- **Normalization of Disasters:** The core thesis is that extreme weather is no longer an "exception" but a daily reality. The jump from 88% of days in 2024 to 99% in 2025 shows a near-total saturation of climatic instability.
- **The Geography of Vulnerability:** Disasters are not uniform. States like Himachal Pradesh (Himalayan ecology) and Kerala (Western Ghats/Coastal) are disproportionately affected, highlighting the fragility of specific Indian biomes.
- **Shift in Disaster Management:** The argument moves from "Response and Relief" to "Pre-disaster Resilience." This involves engineering culverts and urban planning based on climate science rather than historical averages.
- **The Monitoring Gap:** A critical argument is made against "Data Inequality." By monitoring only metros, the state ignores the "breathing reality" of 1.2 billion people, leading to flawed policy-making.
- **Behavioral Ecology of Predators:** The report argues that tiger attacks are a symptom of "Saturation and Overlap." When 40% of tiger territory is shared with 60 million people, conflict is a mathematical certainty rather than an anomaly.

- **Historical Evolution of the Issue**

- **Pre-Independence:** Focus on resource extraction; Forest Acts aimed at timber revenue rather than conservation.

- **1970s-80s (The Turning Point):** Stockholm Conference (1972) led to the Wildlife Protection Act (1972) and Project Tiger (1973). The CSE began its reporting in 1982, marking the start of organized civil society advocacy.

- **1990s-2000s:** Shift toward air quality concerns (SC mandates on CNG in Delhi) and the enactment of the Biological Diversity Act (2002).

- **2015-Present:** The Post-Paris Agreement era. Focus shifted to "Climate Adaptation." The 2025-26 data represents a new phase where the "Ecological Backlash" has arrived, moving the needle from mitigation to survival.



# India's 2025-2026 Environmental Crisis: Navigating the Ecological Backlash

**Context Summary:** India faces saturated climatic instability, massive 'data dark' zones in air monitoring, requiring a shift toward Nature-Based Solutions (NbS) and climate-integrated infrastructure.

## THE REALITY OF THE ECOLOGICAL BACKLASH

### 99% of Days Witnessing Extreme Weather

In 2025, EWEs occurred almost daily, signaling a normalization of disasters. (vs 89% in 2024)

Cloudbursts & Heatwaves



**Agricultural Damage:** 17.41 Million Hectares of crop loss



**Extreme Weather Frequency:** 99% of days in 2025



**Air Monitoring Gap:** 85% of the population unmonitored



### 85% of India in 'Data Dark' Zones

Only 15% of the population lives within 10km of an air quality monitor, creating structural governance inequality.

**Air Monitoring Gap:** 85% of the population unmonitored.



### The Tiger-Human Overlap Crisis

40% of tiger territory is shared with 30 million people, making human-wildlife conflict a mathematical certainty.

## THE WAY FORWARD: RESILIENCE & JUSTICE

### RELIEF



### Shift from 'Relief' to 'Resilience'.

Audit infrastructure against 50-year climate projections rather than reacting to disasters.

### RESILIENCE



### Adopting Nature-Based Solutions (NbS)

Use 'Sponge City' concepts—restoring wetlands and floodplains to absorb excess rainfall naturally.



### Democratization of Environmental Data

Expanding air monitoring to Tier-2/3 towns to fulfill the 'Right to Life' (Article 21).



### Democratization of Environmental Data

Expanding air monitoring to Tier-2/3 towns to fulfill the 'Right to Life' (Article 21).

# Why does the Strait of Hormuz's closure matter?

Where is the Strait of Hormuz and what is its significance? Why have tensions in West Asia affected this passage? What does Iran have to do with the near-complete closure of the strait? How does the situation affect India and what is the government doing about it?

M. Kalyanaraman

## The story so far

**T**he Strait of Hormuz, one of the world's most strategically important chokepoints, has been experiencing a near-total collapse in commercial traffic following rising tensions in West Asia. More than 20% of the world's total oil and gas shipments, and nearly 40% of India's, pass through the strait.

## What is the significance of the strait?

The Strait of Hormuz, only 23 kilometres wide at its narrowest, lies between Iran, Oman, and the UAE. It is a vital route for oil and gas from Saudi Arabia, Qatar, Kuwait, Iraq, and Iran leaving the Persian Gulf to various destinations.

Other important shipping chokepoints in the world include the natural Malacca Strait off Singapore through which almost the entire west-bound Chinese maritime trade takes place; the Bab al Mandab at the mouth of the Red Sea, which has come under Houthi influence; the artificial Suez Canal connecting Europe and Africa-Asia; the artificial Panama Canal linking the Pacific and Atlantic Oceans; and the straits of Bosphorus and Dardanelles connecting the Mediterranean and Black Sea via the Sea of Marmara, which are crucial not just for nations such as Romania but also for Russia.

While Egypt and Panama hold sovereignty over the Suez and Panama canals, respectively, Turkey has exclusive sovereign rights over the Bosphorus and Dardanelles straits. Nations such as Malaysia and Singapore, and Iran and Oman play a major role in securing the natural straits (Malacca and Hormuz) while not holding sovereignty over them. India has been building naval presence in the Andaman and Nicobar Islands with the strategic aim of gaining leverage over Chinese trade across the Malacca Strait.



**Oil tankers** are seen off the coast of Fujairah, as Iran vows to 'close' any ships transiting the Strait of Hormuz, in the UAE, 01/11/24

Some 40% of India's oil flows through the strait

## What is the current situation?

Since February 28, when the U.S. and Israel attacked Iran, and Iran retaliated, ship traffic across the strait has reduced by some 95%. Nine ships have faced attacks in or near the strait. Shipping is a high-risk business and even small damages can prove costly to repair. Lloyd's List Intelligence, a maritime information provider, estimates that some 600 ships are now stranded in the region. Some 250 are bulk carriers carrying loose cargo such as coal, ores, and grain. Others include some 200 oil tankers and 50 gas carriers.

## Can countries just halt shipping lanes?

International law generally treats the seas as commons. Though territorial waters and exclusive economic zones are recognised, in general, laws and practices tend to be favourable towards free usage of all of the seas by merchant ships, and by naval ships for "innocent" passage.

In the past, Egypt has shut down the Suez Canal, Panama has not shut down its canal. No country can order the shutdown of the Straits of Hormuz and Malacca as its sovereign right. However, lack of security, emanating from threats and attacks, can make shippers wary of making the passage due to fears of loss of life and property.

As a result, insurance costs can balloon. In the current situation, insurance premiums have climbed 10-15 times on a case-by-case basis depending, among other factors, on whether a ship is affiliated with any of the belligerent parties. A rough estimate suggests that purchasing insurance for just one week of a ship transiting the strait would cost nearly as much as what the owner would normally pay for a year.

## Are there alternatives to this strait?

Saudi Arabia can transport fuels to its western ports on the Red Sea, such as Yanbu, through pipelines. However, ship traffic in the Red Sea plummeted when Houthi attacks started in 2023-24. In October 2023, for instance, there were around 2,300 ship transits across Bab-el Mandab, the strait at the mouth of the Red Sea. By January, the number had dwindled to less than half of that. Since then, ship transits have only marginally gone up. Any attempt to leverage Red Sea ports may invite attacks from the Houthis, who are aligned to Iran.

## How does closing the strait help Iran?

Iran has spoken in multiple voices over allowing ship passage. Currently, about one in five ships passing through the strait are Iranian. While those speaking for the Iranian government have said they would not like ship traffic to halt, agencies such as the Iranian Revolutionary

Guards have threatened attacks. Iran hopes that closing the strait will force world opinion to bear upon Israel and the U.S. to end the conflict.

The strait is a leverage that Iran has historically exercised, such as during the Iran-Iraq war in the 1980s. At the time, the U.S. allowed merchant ships registered in other nations to fly its flag. This provided legal sanction for the U.S. to deploy its Navy to escort merchant ship convoys across the strait.

India's response was unique then. Leveraging its neutrality and positive relationships in the region, the Shipping Corporation of India (SCI) had its ships painted 'INDIA' in big, bold white letters against the black hull so that the ships would be visible and stand out as belonging to India. Although there were attacks on SCI ships, the move did succeed to a large extent.

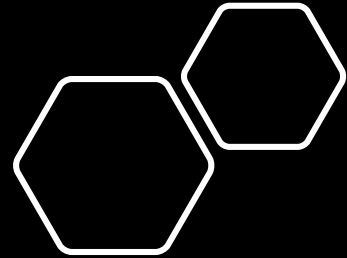
This time too, the U.S. President has vowed to keep ship traffic flowing through the strait. He has talked about escorting ships to provide direct security and also help defray insurance costs. India has been in touch with U.S. authorities for securing maritime insurance cover from the International Development Finance Corporation. The proposal had come from the U.S. government, officials have said.

## How does the situation affect India's economy and oil prices?

Some 40% of India's oil flows through the strait. Qatar supplies half of India's liquefied natural gas (LNG) imports, which in turn provide half of the country's natural gas needs. Qatar shut down its LNG production when the conflict began. While LNG is regasified to supply city gas uses such as for cooking, power plants and other industrial uses, about 30% of India's natural gas is directed towards fertiliser production. Though this is the off season for fertilisers, the situation may not recover fast enough when ammonia fertiliser demand picks up later this year. The government is actively pursuing other LNG sources, such as the U.S., Russia, and Australia.

Some 60% of India's Liquefied Petroleum Gas (LPG), which is mostly a mixture of propane and butane, comes from imports largely upstream of the strait. A shortage of LPG, the dominant cooking gas in India, is far more worrying. The government has come up with a series of measures, such as tweaking the oil refining process to produce more of propane-butane and prioritising cooking gas use of propane-butane.

The U.S. has given the green light for India's purchase of Russian crude for 30 days, which is a relief. India has built supply networks with Russia and these will come in handy. Overall, Brent crude price has been hovering below \$90 (it shot past \$125 when Russia attacked Ukraine). In a reflection of the turn towards Russian oil, high sulphur Urals oil from Russia is now costlier than Brent oil in India. Increase in global crude prices may force the Indian government to increase administered price hikes in petrol and other fuels for transport and other uses, leading to a spiralling effect on the economy.





- **Key Terms and Explanations**

- **Chokepoint:** A narrow geographical feature (such as a strait) that significantly restricts the flow of traffic, particularly ship traffic. Their closure or disruption has outsized impacts on global trade.
- **Strait of Hormuz:** A waterway separating the Persian Gulf and the Gulf of Oman. It is the world's most important oil transit chokepoint.
- **Innocent Passage:** A concept in the Law of the Sea (UNCLOS) that allows a vessel to pass through the territorial waters of another state, subject to certain conditions (it must not be prejudicial to the peace or security of the coastal state).
- **International Development Finance Corporation (IDFC):** A U.S. government agency that provides financing for private development projects. In this context, it is being used to provide maritime insurance.
- **LPG (Liquefied Petroleum Gas):** Primarily propane and butane; used in India mostly as "cooking gas."
- **LNG (Liquefied Natural Gas):** Methane cooled to liquid form; used for power, fertilizer, and industrial fuel.
- **Administered Price Mechanism (APM):** A system where the government sets the prices of essential commodities (like petrol or diesel) rather than letting market forces decide.



- **Main Arguments and Substantive Parts**

- The core thesis is that the **Strait of Hormuz is a global economic artery**, and its disruption creates a "polycrisis"—affecting energy security, food security (via fertilizers), and diplomatic relations.
- **Vulnerability of Global Energy:** 20% of global oil/gas and 40% of India's oil pass through this 33-km wide gap. Its near-closure (95% traffic drop) isn't just a regional issue; it's a global inflationary trigger.
- **The Insurance Barrier:** Even if the strait isn't physically "blocked" by a chain, the skyrocketing insurance premiums (10–15x increase) act as a de facto blockade.
- **Iran's Strategic Leverage:** Iran uses the "threat of closure" as a diplomatic tool to pressure the West and Israel. The dual-voice approach (the government vs. the Revolutionary Guard) allows for "plausible deniability."
- **India's Specific Crisis:** Unlike some nations, India's reliance is twofold: crude oil for transport/industry and LPG/LNG for domestic households and agriculture.



- **Historical Evolution of the Issue**

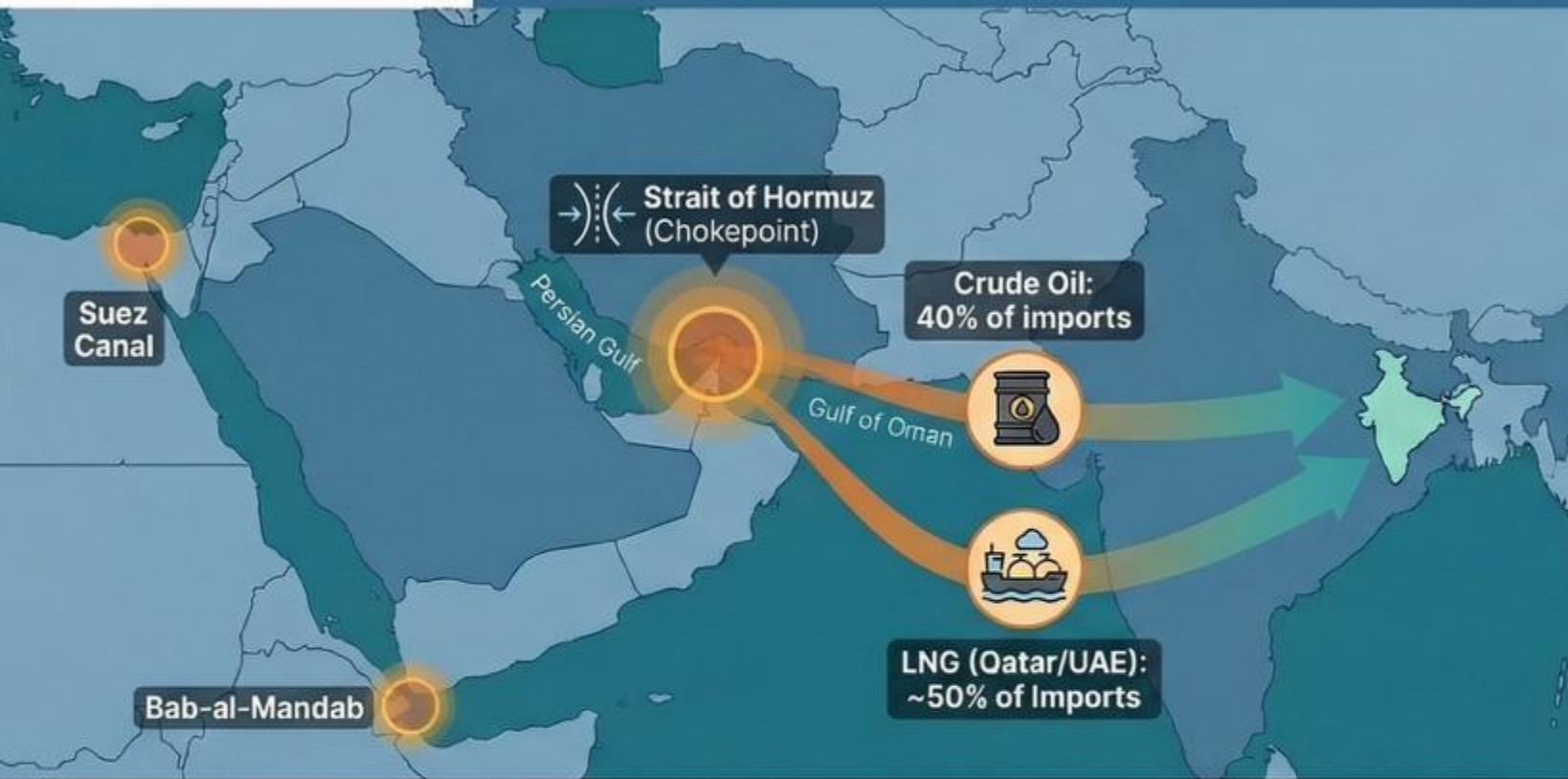
- **Pre-1980s:** The strait was a relatively stable passage under the oversight of the Shah of Iran (a Western ally).

- **The Tanker War (1980–1988):** During the Iran-Iraq War, both sides attacked merchant tankers. This led to "re-flagging" (ships flying the U.S. flag for protection). India famously painted "**INDIA**" on its ships to assert neutrality.

- **Post-2000s Nuclear Tensions:** Whenever Western sanctions were tightened on Iran due to its nuclear program, Tehran threatened to close the strait.

- **2023–2024 Red Sea Crisis:** Houthi attacks in the Bab-al-Mandab shifted focus to the fragility of West Asian maritime routes.

- **2026 Scenario (Current):** Direct military friction between Israel/U.S. and Iran has led to the most significant traffic collapse in decades.



## INDIA'S STRATEGIC WAY FORWARD



### 1. BUILDING STRATEGIC BUFFERS

Accelerating Expansion of Strategic Petroleum Reserves (SPR) to cushion 30-90 day supply shocks.



### 2. MULTI-ALIGNED DIPLOMACY

Balancing relations to maintain neutral maritime branding for Indian vessels.



### 3. THE ENERGY TRANSITION

Shifting to National Green Hydrogen Mission & EVs to break long-term 'Strait Dependency'.

## THE 'DE FACTO' BLOCKADE & POLYCRISIS EFFECT



**Skyrocketing Insurance Premiums**  
(10-15x increase)

**Cost-Push Inflation**

**Household LPG (Ujjwala Scheme)**

**Agriculture (Fertilizers) & Food Security**

# How does Canada's uranium deal help India?

What uranium 'stocks' does India have? Does the latest deal involve the 2010 India-Canada Civil Nuclear Cooperation Agreement? How does India use its uranium? How is the country's nuclear power programme faring?

**Yasudevan Mukundh**

## The story so far:

**I**n its quest for energy security, on March 2, India signed a Canadian \$2.6-billion deal with Cameco. The Canadian company is among the world's top three largest uranium producers by volume. The deal ensures a supply of around 10,000 tonnes of uranium between 2027 and 2035 to India.

## What uranium 'stocks' does India have?

India has both domestic reserves and imported stockpiles of uranium. The domestic reserves amount to 4.2-4.3 lakh tonnes of ore, spread across the major mines of Jaduguda and Turamdih in Jharkhand and Tummalapalle in Andhra Pradesh. The quantum of extractable uranium metal from the ore is estimated to be 76,000-92,000 tonnes.

The order of magnitude difference between the ore and the metal is because Indian ore is 'low grade' (0.02-0.45% concentration). On the other hand, Canada has high-grade ore (30-100 times richer than Indian ore).

India has increasingly relied on imports, which currently meet nearly three-fourths of the civilian requirement. Aside from the Cameco

Indian ore is low-grade (0.02-0.45%), while Canadian ore is 10 to 100 times richer

deal, India also finalised a supply agreement with Kazatomprom of Kazakhstan in February, and has ongoing contracts with Uzbekistan and Russia (both with low-grade ore). The government is also building a reserve intended to hold five years' supply of fuel to protect against supply chain shocks. While importing uranium ore is cheaper than extracting it, it cannot legally be used in nuclear weapons. This is why India also mines ore domestically.

## Does the deal involve the 2010 agreement?

The deal with Cameco comes under the India-Canada Civil Nuclear Cooperation Agreement (NCA). This was signed in 2010, two years after the Nuclear Suppliers Group issued its 'clean' waiver for India, allowing it to engage in civil nuclear trade despite not signing the Nuclear Non-Proliferation Treaty. The waiver, in turn, was made possible by the 123 nuclear agreement between India and the U.S.

Unlike the deal with Kazakhstan (which is less intrusive), the NCA requires India to provide "fissionable material accounts" to Canada, which critics have often called a slight against Indian sovereignty. On the flip side, the NCA has also been criticised for tacitly supporting India's nuclear weapons programme: the more uranium India imports for civilian use, the more domestic uranium it can vouchsafe for military use.

## How does India use its uranium?

India currently operates 24 nuclear reactors with a generation capacity of around 9 GW. The 700-MW pressurised heavy water reactors (PHWRs) that currently provide 6-7 GW, or roughly 3%, of India's total electricity use uranium as fuel. The government is committed to increasing nuclear power capacity to 100 GW by 2047. Previous attempts to up this contribution have been set back by issues with land acquisition and local protests, however.

Significant amounts of uranium are also used in research reactors, such as Dhruva in Trombay, to produce medical isotopes such as technetium-99m and iodine-131 and for advanced materials science research.

In the 2025-26 Union Budget, Finance Minister Nirmala Sitharaman allocated ₹20,000 crore to develop a new generation of small modular reactors, which typically use 3-5% enriched uranium.

Domestic uranium is also used for nuclear warheads (currently estimated to number around 170) and the nuclear-powered INS Arihant class submarines.

## How is India's nuclear power programme faring?

India is currently transitioning from Stage 1 to 2 of the three-stage programme. In Stage 1, PHWRs will use natural uranium-235 to produce electricity and plutonium-239 as a byproduct. In Stage 2, fast breeder reactors will use a mixed oxide fuel of uranium-238 and plutonium-239 to produce electricity, uranium-233, and more plutonium-239. (The reactors are called so because they will produce more fuel than they consume.) The prototype fast breeder reactor (PFBR) in Kalpakkam is currently in an advanced stage of commissioning. Finally, advanced heavy water reactors will use plutonium-239 and thorium-232 as fuel, producing electricity and uranium-233. Homi J. Bhabha envisioned this three-stage programme to take advantage of the fact that India hosts 20-25% of the world's thorium deposits.

However, the programme has been beset by numerous delays and cost overruns. The fast breeder test reactor was built at Kalpakkam in 1977 but the government did not sign off on the PFBR until the early 2000s, thanks in part to sanctions against India over its nuclear tests. The PFBR's cost also nearly doubled from ₹3,492 crore at the time it was designed to more than ₹6,800 crore in 2019.

In March 2013, the Department of Atomic Energy had said in a reply in the Lok Sabha, "The time of large-scale thorium deployment is expected to be 3-4 decades after the commercial operation of fast breeder reactors with short doubling time." Given the PFBR's own timeline, this period could be in the 2060s, if not later.

Former Department of Atomic Energy Chairman Anil Kakodkar has explained that the doubling time – the time taken for one fast breeder reactor to produce enough fuel to start a second – is 15-20 years. To generate 100 GW, then, India has to go through several doubling cycles, which could explain the multiple deals now to secure the supply of uranium.





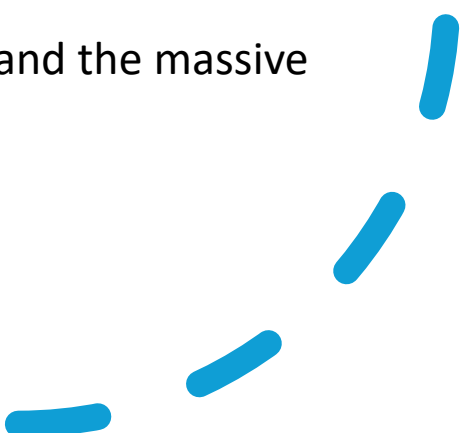
**Striking a deal:** Prime Minister Narendra Modi and Canadian Prime Minister Mark Carney at Hyderabad House, in New Delhi. *As*



- **Key Terms and Explanations**

- **Uranium Ore Grade:** Refers to the concentration of uranium in the mined rock. High-grade ore (found in Canada) contains significantly more uranium per tonne than low-grade ore (found in India), making extraction far more cost-effective.
- **NSG Waiver (2008):** A "clean" waiver granted by the **Nuclear Suppliers Group** that allowed India—a non-signatory to the Non-Proliferation Treaty (NPT)—to engage in global nuclear trade.
- **Fissionable Material Accounts:** Detailed logs of how imported nuclear fuel is used. Canada requires these to ensure that imported uranium is used exclusively for civilian energy and not diverted to military purposes.
- **Small Modular Reactors (SMRs):** Advanced nuclear reactors with a capacity of up to 300 MW (about one-third of traditional reactors). They are "modular," meaning they can be factory-built and transported to a site.
- **Doubling Time:** The time it takes for a breeder reactor to produce enough fissile material to fuel a second reactor of the same capacity.

- 
- **Main Arguments and Substantive Parts**
  - The core thesis of recent developments is that **energy security is national security**. India is leveraging international diplomacy to fuel its domestic growth while bypassing the limitations of its own low-grade uranium reserves.
  - **The Supply-Demand Gap:** India currently imports nearly **70-75%** of its civilian uranium. Domestic ore is not only scarce but also expensive to process due to low concentration (0.02%–0.45%).
  - **The Strategic Decoupling:** By importing uranium for civilian reactors, India can reserve its limited domestic supply for strategic (military) use, such as nuclear warheads and the *INS Arihant*-class submarines.
  - **Technological Shift:** The **Union Budget 2025-26** signaled a shift toward **SMRs** with a ₹20,000 crore allocation, aiming for 100 GW of nuclear capacity by 2047.
  - **The Three-Stage Program:** India remains committed to the Homi Bhabha vision—moving from Uranium-based reactors to Plutonium-based breeders, and finally to Thorium-based reactors—to utilize its world-leading thorium deposits.

- 
- **Historical Evolution of the Issue**
  - **1950s-60s:** Early cooperation with Canada (CIRUS reactor) and the US (Tarapur).
  - **1974 (Pokhran-I):** Canada severed ties after India used "Smiling Buddha" to demonstrate nuclear capability. Global sanctions followed.
  - **1998 (Pokhran-II):** Further isolation after five nuclear tests; India declared a nuclear-weapon state.
  - **2005-2008 (The Turning Point):** The **Indo-US Civil Nuclear Deal (123 Agreement)** led to the 2008 NSG waiver, ending India's nuclear "apartheid."
  - **2010:** The **India-Canada Civil Nuclear Cooperation Agreement (NCA)** was signed, restoring the partnership.
  - **2025-2026:** Launch of the **Nuclear Energy Mission** and the massive \$2.6 billion Cameco deal.
- 

# Powering Viksit Bharat 2047: India's Strategic Nuclear Roadmap

## THE GLOBAL BRIDGE (SECURING THE PRESENT)



### THE \$2.6 BILLION CAMECO DEAL

A massive agreement with Canada to supply 22 million pounds of uranium through 2035.



# 75%

**IMPORT  
DEPENDENCY**

India imports most civilian uranium because domestic ore is low-grade (0.02%-0.45%) and expensive.

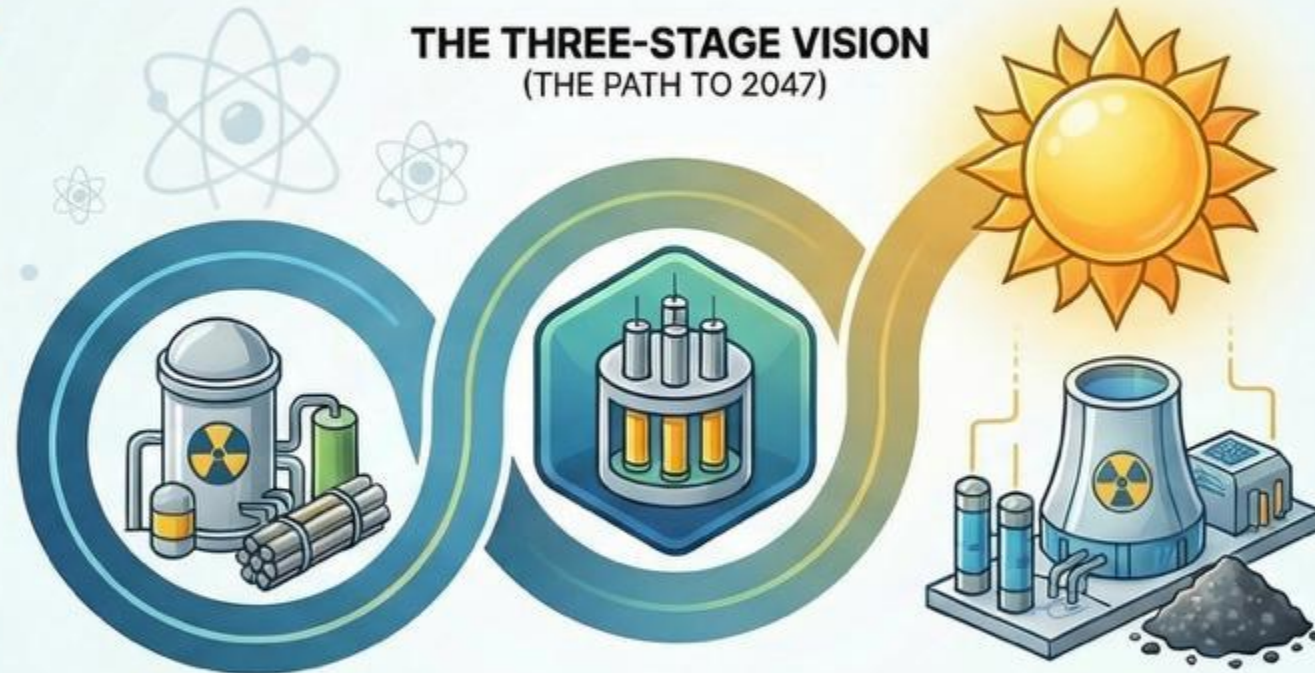


### STRATEGIC DECOUPLING

Imported fuel powers civilian reactors, reserving domestic uranium for military and strategic naval use.

Bridging domestic gaps with international deals to achieve a self-reliant, Thorium-based energy future

## THE THREE-STAGE VISION (THE PATH TO 2047)



### STAGE 1: URANIUM-BASED (PHWRs)

Using natural uranium to generate electricity and create Plutonium-239 as a byproduct.

### STAGE 2: FAST BREEDER REACTORS (FBRs)

Utilizing Plutonium to "breed" more fissile material than consumed; the bridge to Thorium.

### STAGE 3: THE THORIUM CYCLE

Utilizing India's world-leading Thorium reserves for centuries of self-reliant, carbon-neutral energy.

## FUTURE OF INDIAN NUCLEAR TECH & POLICY



### SMALL MODULAR REACTORS (SMRs)

Factory-built 300MW units | Flexible, distributed power with ₹20,000Cr budget.



### STRATEGIC RESERVE

5-Year Uranium Stockpile | Buffer against geopolitical shocks and supply volatility.



### SHANTI ACT, 2025

Private Sector Participation | Modernized legal framework for liability and investment.

# On backlash, Govt. pulls back revised earthquake zoning

Government departments, Metro Rail corporations and infrastructure authorities apprehended a surge in construction costs of marquee projects nationwide on implementation of the new norm

Kunal Shankar  
CHENNAI

Less than four months after issuing a revision to India's earthquake zoning framework, the Centre has withdrawn its own notification following a major backlash from several government departments, Metro Rail corporations and infrastructure authorities that apprehended a surge in construction costs of marquee projects nationwide. The Hindu has learnt.

The Bureau of Indian Standards (BIS) had issued a Gazette notification on November 6, 2025, introducing revised earthquake hazard zoning under the updated IS 1893 (Part II): 2025 code, which governs the earthquake-resistant design of structures. The revised standard was meant to replace the existing IS 1893 (Part II): 2016 framework that currently guides structural design across the country.

However, the revised notification has now been withdrawn through a fresh Gazette notification issued on March 3, 2026, restoring the earlier code with immediate effect.

The reversal follows strong objections from multiple government agencies, including the Ministry of Housing and Urban Affairs (MoHUA), several Metro Rail corporations across northern India, the National Dam Safety Auth-



**On the edge:** Several under-construction developments could risk turning into 'stranded assets' if costs escalated, as

the National Dam Safety Authority (NDSA) and other infrastructure bodies that flagged the potential impact of the revised probabilistic seismic hazard assessment (PSHA) framework on construction costs.

The development also has major implications for India's buildings and construction sector, which had begun expressing concerns over a potential spike in project costs. Developers had warned that the revised zoning framework could disrupt financing for ongoing projects, with some suggesting that several under-construction high-rise developments could risk turning into 'stranded assets' if costs escalated sharply.

The BIS notification issued in November last year significantly revised India's seismic risk framework by

incorporating updated PSHA-based modelling and new hazard parameters. Under the proposed classification, more than 60% of India's landmass would fall under moderate to high earthquake risk zones, representing a major shift in the country's seismic hazard mapping.

A notable change in the revised framework was the introduction of a new highest risk Zone VI, bringing parts of Kashmir, the North-East and the Kutch region of Gujarat under the most stringent seismic design standards. Several other regions across the Himalayan belt were categorised under Zone V, indicating very high seismic vulnerability.

Such changes would have required significant revisions in structural design standards for build-

ings and infrastructure projects, including stronger foundations.

One of the strongest objections to the revised zoning framework came from MoHUA. In a February 2026 communication to the Cabinet Secretariat, the MoHUA flagged "certain technical and financial concerns" arising from the revision of IS 1893.

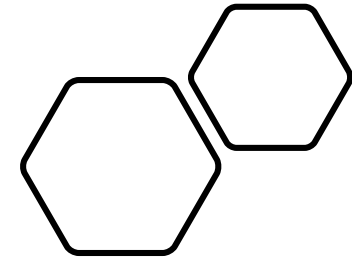
## High financial impact

The MoHUA letter assessed by The Hindu said the proposed revision could have "materially significant financial implications for infrastructure and construction projects", particularly for large public works such as Metro Rail systems and urban infrastructure.

The NDSA also raised scientific objections to the revised hazard values when the draft was circulated in mid-2025.

"We reviewed the draft and felt the values were quite high," a senior NDIA official said. "The hazard value being suggested was much higher than what we were reading from our site investigations." Officials added higher hazard values would automatically translate into higher costs for infrastructure projects.

Technical discussions within government agencies also raised questions about the methodology used in the revised probabilistic seismic hazard assessment.





- **Key Terms and Explanations**

- **Seismic Zoning Map:** A map that classifies regions based on the intensity of earthquakes they are likely to experience. India is currently divided into four zones (II, III, IV, and V).

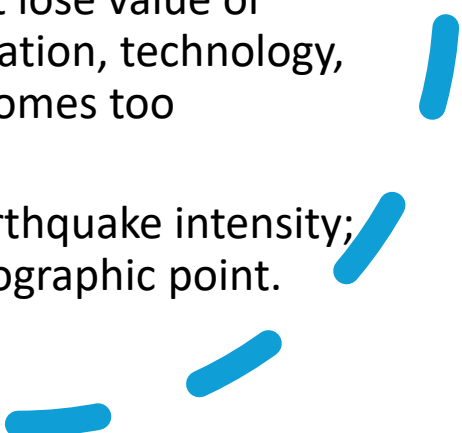
- **IS 1893 (Part 1):** The fundamental Indian Standard code that provides criteria for the earthquake-resistant design of structures.

- **Bureau of Indian Standards (BIS):** The national body responsible for the harmonious development of activities of standardization, marking, and quality certification.

- **Probabilistic Seismic Hazard Assessment (PSHA):** A mathematical method used to estimate the likelihood of various levels of earthquake ground motion occurring at a given location in a given future time period.

- **Stranded Assets:** Investments or infrastructure that lose value or become a liability due to unforeseen changes in regulation, technology, or market forces (e.g., a half-built metro line that becomes too expensive to complete under new safety laws).

- **Peak Ground Acceleration (PGA):** A measure of earthquake intensity; it represents how hard the earth shakes at a given geographic point.





- **Main Arguments and Substantive Parts**
- The core of the issue lies in the **trade-off between safety and cost**.
- **The Pro-Revision Argument:** The BIS intended to modernize India's safety standards. By introducing **Zone VI** and moving 60% of the landmass into higher risk categories, the goal was to prevent catastrophes like the 2001 Bhuj earthquake by ensuring future buildings are significantly more robust.
- **The Economic Counter-Argument:** Government departments (MoHUA, Metro Rail) argued that the "hazard values" in the revision were scientifically over-projected. This would lead to a massive spike in construction costs (more steel, deeper foundations), potentially killing the viability of "marquee projects" like the Bullet Train or High-Speed Rail.
- **The Consensus Gap:** The National Dam Safety Authority (NDSA) pointed out that the new hazard values didn't match actual site investigations, suggesting a disconnect between theoretical modeling and field reality.



- **Historical Evolution of the Issue**

- **Pre-1962:** No uniform national code; designs were based on local British-era observations.
- **1962:** The first version of IS 1893 was published following the 1960 Gurgaon earthquake.
- **Post-1993 Latur & 2001 Bhuj:** These disasters led to significant re-classifications. The "Zone I" (least risk) was eliminated because no part of India was deemed entirely safe from tremors.
- **2016 Revision:** The previous stable standard which focused on four zones.
- **2025–2026 Flip-flop:** The attempt to introduce a 5th zone (Zone VI) and its subsequent withdrawal due to "financial and technical concerns."

UPSC Study Note

**THE 2025 SCIENTIFIC LEAP**



**INTRODUCTION OF ZONE VI**

New "Extreme Risk" category for high-activity regions (Kutch, Kashmir, North-East).



**SHIFT TO PSHA MODELING**

Moved from historical observation to Probabilistic Seismic Hazard Assessment for future ground motion estimates.



**60% LANDMASS RECLASSIFICATION**

Revision would move over half of India into significantly higher seismic risk categories.



**COMPARISON OF NORMS: CURRENT VS. WITHDRAWN**

	Feature	IS 1893:2016 (Current)	IS 1893:2025 (Withdrawn)
1	Zoning Structure	4 Zones (II, III, IV, V)	5 Zones (Added Zone VI)
2	Methodology	Deterministic / Historical	Probabilistic (PSHA)
3	Cost Impact	Baseline Standard	15-25% Increase in Structural Costs

**THE ECONOMIC FRICTION**



**15-25% JUMP IN CONSTRUCTION COSTS**

Higher norms require significantly more steel, deeper foundations, and specialized engineering, straining budgets.



**THREAT OF "STRANDED ASSETS"**

Risk of marquee projects like Metro Rail or Bullet Trains becoming financially unviable mid-construction.



**INTER-AGENCY DATA CONFLICT**

NDSA argued theoretical PSHA hazard values did not match empirical site investigation data.

**THE WAY FORWARD (BALANCING THE DILEMMA)**



**PHASED IMPLEMENTATION**

Apply stricter norms to critical infrastructure (Nuclear/Dams) first, then transition to general housing.



**INTER-AGENCY HARMONIZATION**

Form a task force (BIS, NDSA, MoHUA) to reach scientific consensus on hazard values.



**FINANCIAL INCENTIVIZATION**

Offer tax breaks or safety credits to developers to offset the cost of higher resilience.



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