

ENDOCRINE DISRUPTORS IN PLASTIC WASTE: SCIENCE & TECHNOLOGY

NEWS: Endocrine disruptors in plastic waste: a new public health threat

WHAT'S IN THE NEWS?

Plastic pollution has escalated into a public health crisis, with microplastics and endocrine-disrupting chemicals (EDCs) now detected in human blood, organs, and reproductive fluids, posing serious fertility, cancer, and metabolic risks.

Despite updated plastic waste rules, weak enforcement and lack of EDC-specific regulation call for urgent biomonitoring, safer consumer practices, and investment in non-toxic alternatives.

1. Core Issue: From Pollution to Biological Invasion

- Plastic pollution has escalated beyond environmental degradation to a **biological crisis**, with **microplastics and EDCs** now being detected in **human tissues and organs**.
- This marks a significant shift: plastics are not just waste but **active biological agents** affecting human health, reproduction, and development.

2. What Are Microplastics?

- Defined as **plastic fragments smaller than 5 mm**, formed by degradation of larger plastic items or released directly as microbeads.
- Contrary to past belief, microplastics are **not inert**; they are **biologically reactive**, capable of triggering cellular and hormonal responses.
- **Detected in critical human organs:**
 - **Lungs, heart tissues, placenta, ovarian fluid, breast milk, semen, and blood-stream.**

3. Key Scientific Evidence on Microplastic Exposure

- **Vrije Universiteit Amsterdam (2022):** Detected **microplastics in 80%** of blood samples from human volunteers.
- **Nature Scientific Reports (India, 2024):** Found microplastics in **89% of Indian blood samples**, with an average of **4.2 particles/mL**.
- **Food and Chemical Toxicology (2023):** Showed that low-dose polystyrene exposure in animals caused:
 - **Lower testosterone,**
 - **Reduced sperm count,**
 - **Damage to the blood–testis barrier.**

4. What Are Endocrine-Disrupting Chemicals (EDCs)?

- EDCs are substances that **interfere with the hormonal (endocrine) system**, found in **plastics, personal care products, food packaging**, and **environmental pollutants**.
- They **mimic, block, or alter natural hormone function**, disrupting metabolism, reproduction, immunity, and neurodevelopment.

5. Common EDCs in Plastics and Their Sources

EDC	Common Source	Known Impacts
Bisphenol A (BPA)	Plastic bottles, containers, food linings	Affects estrogen, thyroid, sperm quality
Bisphenol S (BPS)	BPA substitute in “BPA-free” products	Similar hormonal effects as BPA
Phthalates (DEHP, DBP)	Toys, cosmetics, IV tubes	Sperm damage, PCOS, obesity
PFAS	Food packaging, non-stick cookware	Thyroid dysfunction, diabetes, metabolic syndrome

6. Impact on Reproductive Health and Fertility

- **Male Fertility Crisis:**
 - India has seen a **30% decline in average sperm count** over the past 20 years.
 - Microplastics and EDCs impair **spermatogenesis**, lower **testosterone**, and damage the **blood–testis barrier**.
- **Female Reproductive Disorders:**
 - **BPA and phthalates** linked to:
 - **Polycystic Ovary Syndrome (PCOS)**
 - **Endometriosis**
 - **Spontaneous abortion**
 - **Hormonal disruption** includes:
 - Increased **LH levels**
 - Estrogen-progesterone imbalances

7. Cancer Risk and Chronic Health Effects

- **Breast and Reproductive Cancers:**
 - High DEHP levels linked to **3x higher breast cancer risk**.
 - BPA/phthalates associated with **prostate, uterine, and testicular cancers**.
- **Metabolic and Cardiovascular Disorders:**

- EDCs mimic **cortisol and insulin**, increasing risk of **type 2 diabetes** and **obesity**.
- **PFAS exposure** linked to **cardiovascular disease, hypertension, and metabolic syndrome**.
- **Neurodevelopmental Risks:**
 - EDCs in pregnancy may affect **fetal brain development**, contributing to **cognitive deficits** and **behavioral disorders**.

8. Environmental Statistics for India

- India generates **9.3 million tonnes of plastic waste** annually.
 - **5.8 million tonnes** incinerated → releases **toxic emissions**.
 - **3.5 million tonnes** enter **soil, rivers, oceans, and food chains**.
- Poor segregation and recycling result in **widespread microplastic contamination** of **air, water, and food**.

9. Economic Impact of EDC Exposure

- India suffers **₹25,000 crore/year** in losses due to EDC-related health burdens.
 - Includes **healthcare costs, lost productivity, and infertility treatment expenses**.
- The long-term societal cost of untreated EDC exposure will significantly burden public health systems.

10. Policy Gaps and Implementation Challenges

- Despite updates to the **Plastic Waste Management Rules (2016, 2022, 2024)**:
 - **Enforcement is weak**, especially in rural and peri-urban areas.
 - Rules focus on **solid waste**, not on **low-dose EDC effects**, particularly on **children and pregnant women**.
- India lacks:
 - **Biomonitoring frameworks**.
 - **Microplastic regulation in water/food**.
 - **EDC testing protocols** in consumer goods.

11. Recommendations for Mitigation

A. Regulatory & Surveillance Measures

- Establish **biomonitoring systems** for EDCs in:

- **Blood, urine, breast milk, ovarian fluid.**
- Fund **long-term cohort studies** on:
 - Fertility, endocrine disorders, chronic diseases.

B. Public Health & Consumer Awareness

- Promote behavior change to reduce EDC exposure:
 - Avoid **microwaving in plastic**.
 - Use **glass, stainless steel, and non-toxic cookware**.
 - Choose **BPA-free and phthalate-free products**.
 - Encourage **antioxidant-rich diets** (to combat oxidative stress).

C. Infrastructure & Innovation

- Install **microplastic filters in water treatment plants**.
- Incentivise **biodegradable alternatives** to conventional plastics.
- Promote **green R&D** in packaging and product design.

D. Enforcement & Incentives

- Strengthen enforcement of existing **Plastic Waste Rules**.
- Create **plastic credit systems** or **extended producer responsibility (EPR)** for industries.
- Include **EDC exposure limits** in national health and food safety standards.

Source: <https://www.thehindu.com/sci-tech/health/endocrine-disruptors-in-plastic-waste-a-new-public-health-threat/article69751185.ece#:~:text=and%20way%20forward-,Plastic%20pollution%20is%20no%20longer%20a%20distant%20environmental%20concern%3B%20it,reproductive%20dysfunction%20and%20chronic%20diseases.>

CAN SUPREME COURT HALT STATE LAW: POLITY

NEWS: Can the Supreme Court halt an Act passed by a State? | Explained
WHAT'S IN THE NEWS?

The Supreme Court in 2011 declared the use of untrained civilians like SPOs in anti-Maoist operations unconstitutional. In 2024, it held that passing a new law (Chhattisgarh Auxiliary Act) is not contempt, reaffirming the doctrine of separation of powers.

1. Background of the Case: Use of SPOs in Chhattisgarh

- **Core Issue:** Use of **Special Police Officers (SPOs)** and **state-backed vigilante groups** like **Salwa Judum** and **Koya Commandos** in anti-Maoist operations.
- These groups were composed largely of **untrained tribal youth**, armed and used in **combat operations** in Maoist-affected regions.
- **Petitioners:** Activist **Nandini Sundar** and others challenged the policy on **constitutional** and **human rights** grounds.

2. Constitutional Violations Alleged by Petitioners

- **Article 14:** Right to equality violated by recruiting **civilians without police training**, creating two classes of law enforcement.
- **Article 21:** Right to life and dignity violated by **placing untrained civilians in life-threatening combat situations**.
- **State Responsibility:** Petitioners argued this amounted to **abdication of the state's duty** to provide professional, accountable policing.

3. Key Supreme Court Verdict – July 5, 2011

- In a landmark **writ order**, the SC ruled strongly **against the use of SPOs** in counter-insurgency.
- **Directions issued:**
 - State of Chhattisgarh to **cease appointing SPOs** in counter-insurgency roles.
 - **Recall all weapons** issued to SPOs.
 - **Disband Salwa Judum and Koya Commandos**.
 - Union Government to **stop funding** the SPO recruitment.
- **Observations by the Court:**
 - **Use of poorly trained civilians as armed combatants is unconstitutional.**
 - Violates the **principles of human dignity, equality, and rule of law**.
 - Represents a **failure of state machinery** to maintain lawful and professional policing standards.

4. Chhattisgarh's Legislative Response – 2011

- In response, the Chhattisgarh government passed the **Chhattisgarh Auxiliary Armed Police Forces Act, 2011**.
- Claimed to address SC concerns while **continuing auxiliary policing**.

Key Provisions of the New Act:

- **Eligibility and Screening:**

- Recruitment only through a **screening committee**.
- Minimum eligibility and background check standards introduced.
- **Training Requirement:**
 - Mandatory **minimum 6-month training** for auxiliary recruits.
- **Role and Deployment:**
 - Auxiliary forces to **aid regular forces**, but not deployed at **front-line combat**.
 - Emphasis on **non-combat support roles** like patrol and logistics.
- **Justification by State:**
 - Asserted that these reforms addressed the **constitutional defects** flagged by the SC in its 2011 ruling.

5. Contempt Petition: Fresh Legal Challenge

- Petitioners alleged that the **new Act was merely a rebranding** of the banned SPOs system.
- Claimed it was an attempt to **circumvent the 2011 Supreme Court order**.
- Sought action against the state for **contempt of court**.

6. Supreme Court's 2024 Ruling on Contempt Petition

A. Verdict:

- The SC **dismissed the contempt petition**.
- Held that **passing new legislation does not amount to contempt** unless it violates constitutional principles.

B. Grounds for Rejection:

1. Doctrine of Separation of Powers

- **Legislature has independent powers** to enact new laws unless:
 - They are beyond **legislative competence**, or
 - They are **unconstitutional**.
- Court emphasized that **making laws, even after a judgment, is not contempt**.

2. Judicial Review vs Contempt Jurisdiction

- Constitutionality of a law can be challenged through **judicial review**.

- However, **legislating in response to a judgment does not qualify as contempt** unless it **explicitly defies the court's directives**.

3. Compliance Observed

- The Court noted that Chhattisgarh had complied with the 2011 judgment:
 - **Weapons recalled.**
 - **SPO appointments halted.**
 - **Progress reports submitted.**
- Hence, no case of **wilful disobedience** was found.

7. Legal Doctrines and Precedents Cited

- **Separation of Powers:** Judiciary cannot stop the legislature from legislating, but can test laws for constitutional validity.
- **Indian Aluminium Co. v. State of Kerala (1996):**
 - Reinforced the **balance between legislature, executive, and judiciary.**
 - Judiciary's role is to **review**, not to **preempt legislative action.**

8. Broader Significance of the Case

Judicial Oversight and Accountability

- The 2011 judgment remains a landmark decision in **protecting human rights** during internal security operations.
- Reinforces that **armed civilian groups cannot substitute the state police.**

Legislative Response and Flexibility

- Shows that the **legislature can respond to court judgments** with reformed laws, provided they stay within constitutional bounds.

Limits of Contempt Jurisdiction

- Clarifies that **judicial review** and **contempt of court** are **distinct mechanisms**:
 - Review tests **validity of the law.**
 - Contempt punishes **willful non-compliance.**

Source: <https://www.thehindu.com/news/national/can-the-supreme-court-halt-an-act-passed-by-a-state-explained/article69769874.ece>