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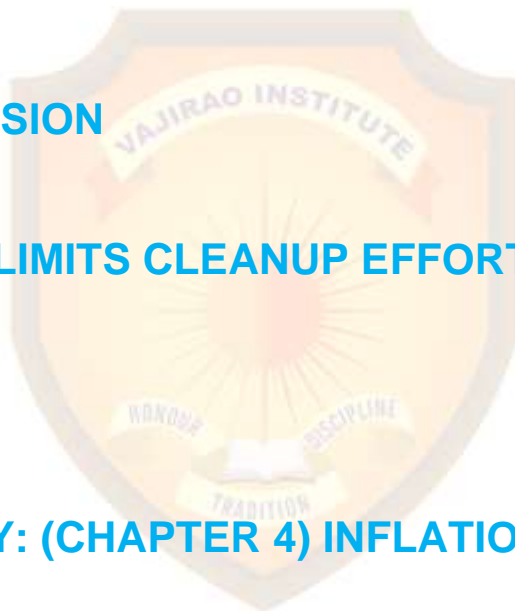


# **TODAY'S ANALYSIS**

## **(28 February 2025)**

### **TOPICS TO BE COVERED**

- **NASA's PUNCH MISSION**
- **CLIMATE CHANGE LIMITS CLEANUP EFFORTS BY ACCELERATING ALGAL GROWTH**
- **ECONOMIC SURVEY: (CHAPTER 4) INFLATION DYNAMICS**
- **MCQs**



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## NASA's PUNCH MISSION

- NASA is launching a new mission called **PUNCH** (Polarimetry to Unify the Corona and Heliosphere) to **study the sun's outer atmosphere** and understand solar winds and **Coronal Mass Ejections (CMEs)**.
- These solar events affect space weather and can impact systems on Earth like satellite communication and GPS.
- The mission will launch on **February 28, 2025**, using **SpaceX** to carry four small satellites into **Low Earth Orbit (LEO)**.

### MISSION DETAILS

- **Launch Date:** February 28, 2025.
- **Launch Provider:** SpaceX.
- **Orbit:** Low Earth Orbit (LEO).
- **Satellites:** 4 suitcase-sized satellites (each weighing ~64 kg).
- **Mission Life:** 2 years.
- **Main Instruments:**
  - Three **Wide Field Imagers (WFI)**.
  - One **Narrow Field Imager**.

#### Purpose:

- PUNCH aims to study the sun's **corona** (outer atmosphere) and track the solar winds and CMEs.
- These phenomena have a direct impact on **space weather**, which can affect communication systems, GPS, and power grids on Earth.
- Understanding solar weather better can help predict its effects on Earth.

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## KEY FEATURES OF PUNCH

- **Polarisation Measurement:**

- PUNCH will use **polarised light** to study the sun.
- It will use **polarising filters** to measure how sunlight is scattered by particles in the corona, giving scientists detailed information about solar activity.

- **3D Imaging:**

- PUNCH will use four cameras working together to create **3D images** of the sun's corona, offering a unique look at solar winds and CMEs.

- **Continuous Imaging:**

- The cameras will take images of the sun every **four minutes** and capture both **polarised** and **unpolarised light** at different times.

- **Wide and Narrow Field Imaging:**

- The **Wide Field Imagers (WFI)** will capture a large area of the sun's atmosphere, while the **Narrow Field Imager** will focus on specific regions for more detailed observations.

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## SCIENTIFIC IMPACT

- **Tracking Solar Winds and CMEs:**

- PUNCH will help scientists understand how solar winds and CMEs form, evolve, and move through space.
- This information is important for predicting when these solar events might reach Earth.

- **Space Weather Prediction:**

- Data from PUNCH will help improve **predictions of space weather events**.
- This will help reduce the impact of solar storms on Earth and space missions.

## WHY IT MATTERS?

- **Impact on Earth:** Solar events can disrupt **satellite communication, GPS systems,** and **power grids** on Earth.
- **Space Exploration:** Solar weather can also affect spacecraft, so understanding it is important for protecting both Earth's technology and future space missions.
- **Better Predictions:** The mission will improve our ability to predict space weather, helping us prepare for its effects.

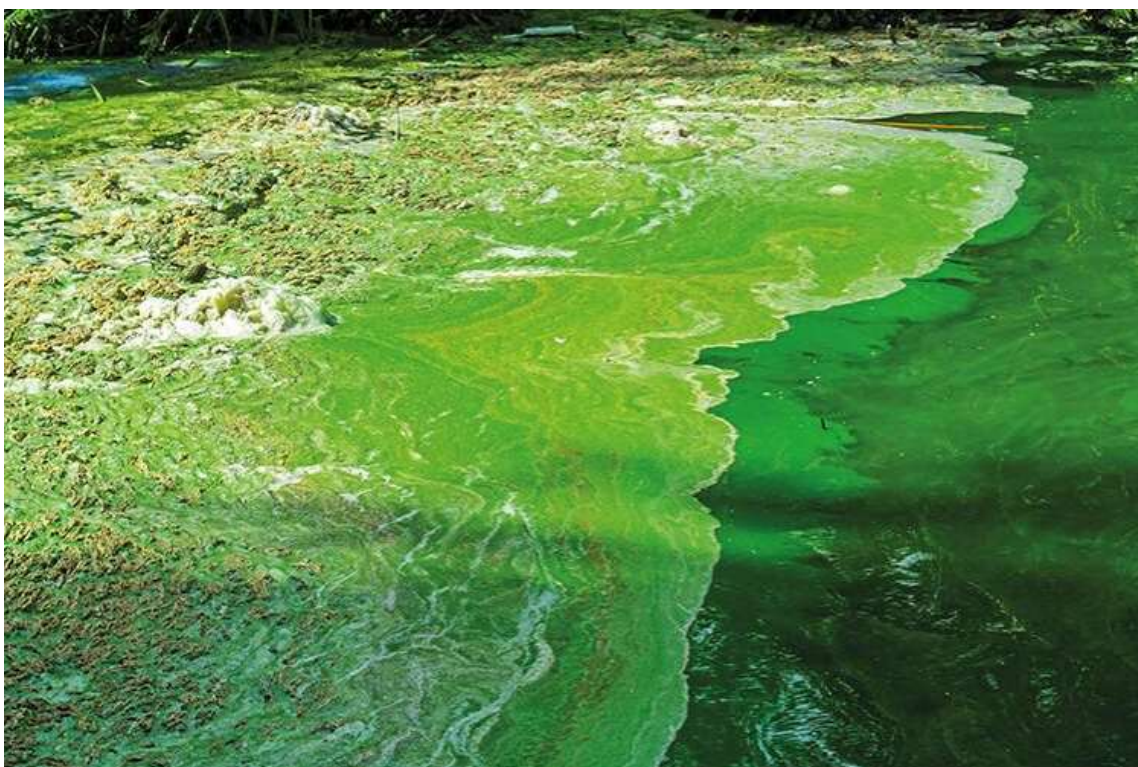
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## CLIMATE CHANGE LIMITS CLEANUP EFFORTS BY ACCELERATING ALGAL GROWTH



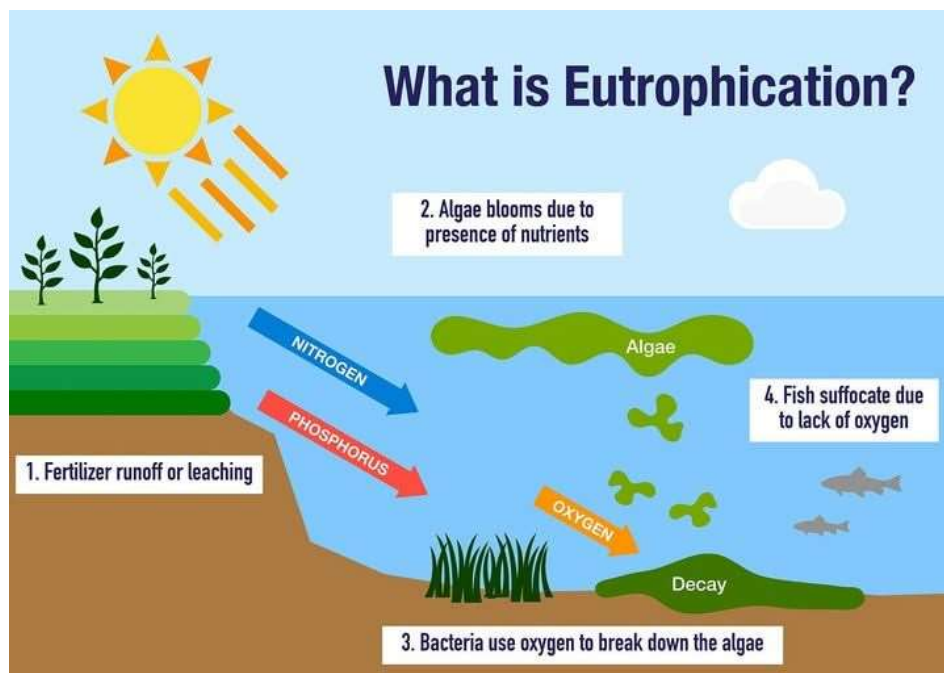
- A study led by a researcher from the **University of Waterloo** has found that **climate change** is increasing the risk of **algal blooms** in the **River Thames**, even though there has been a significant reduction in phosphorus levels over the past 40 years.
- The study, published in **Communications Earth & Environment**, analyzed the river's **150-year water quality record** to understand the impact of climate change on river health.

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## WHAT IS AN ALGAL BLOOM?



- An **algal bloom** is a rapid increase in the population of algae in a water body, such as a lake, river, or ocean.
- These **blooms can occur when certain environmental conditions, like warm temperatures, excess nutrients** (especially **phosphorus** and **nitrogen**), and calm waters, promote the growth of algae.
- While some algae are harmless, certain types of algae, such as **cyanobacteria** (blue-green algae), can be toxic.

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- These toxic blooms **can harm aquatic life by depleting oxygen levels** in the water, suffocating fish and other organisms.
- They can also **release harmful toxins** that are dangerous to animals and humans, potentially affecting drinking water and recreational activities like swimming or fishing.
- In addition to ecological harm, **algal blooms can increase the cost of water treatment** and limit the use of water for activities like boating and swimming.

## KEY FINDINGS

- **Phosphorus Reduction:** Over the last 40 years, phosphorus loads in the river have decreased by about **80%** due to better **wastewater treatment** and improved **agricultural practices**.
- **Climate Change Impact:** Despite these improvements, **rising river temperatures** caused by climate change are increasing the likelihood of **algal blooms**.
- **Algal Bloom Types:**
  - **Spring diatom blooms.**
  - **Summer cyanobacterial blooms (toxic).**

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## IMPACTS OF ALGAL BLOOMS

- **Shading out and suffocating aquatic life.**
- **Decreasing oxygen levels** in the water as the algae decompose.
- **Releasing potentially toxic cyanobacteria.**

### Economic and Recreational Impacts:

- Algal blooms can **increase the cost of drinking water treatment.**
- They can also **limit recreational activities** such as **sailing, fishing, and swimming.**

## PHOSPHOROUS & WATER QUALITY MANAGEMENT

- **Phosphorus management** remains crucial in preventing algal blooms since algae need phosphorus to grow. Despite the reductions in phosphorus, levels are still high enough to allow algal growth.
- The study suggests that **water quality management** efforts are not fully effective in the face of rising water temperatures due to climate change.

## STUDY SIGNIFICANCE

- The River Thames dataset is the **world's longest continuous water quality record.** It offers a detailed history of how human activity and policies have affected the river's quality.

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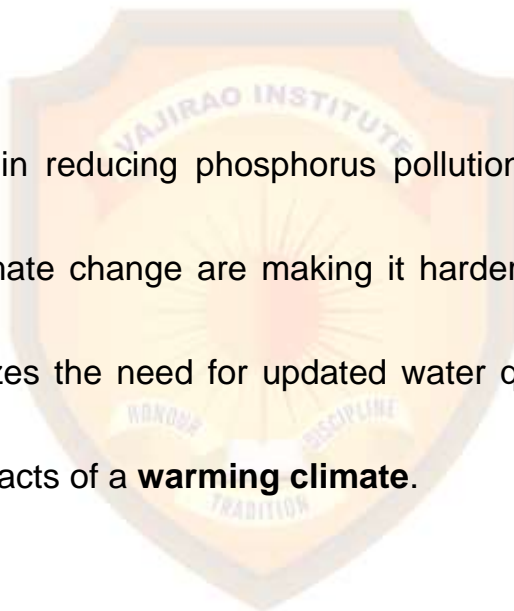




- The study provides a **unique historical perspective** on how **socio-economic, agricultural**, and **industrial** activities have influenced the river's health.
- The research highlights how **climate change** is creating new challenges in managing water quality.

## CONCLUSION

Despite significant progress in reducing phosphorus pollution in the River Thames, rising water temperatures from climate change are making it harder to manage the risks of algal blooms. This study emphasizes the need for updated water quality management strategies that take into account the impacts of a **warming climate**.



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# ECONOMIC SURVEY:(CHAPTER 4)

## INFLATION DYNAMICS

### Introduction to Inflation Dynamics

**Inflation** is a critical economic issue affecting both daily life and long-term economic planning. The persistent inflationary pressures over the past few years have posed significant challenges for policymakers globally. Central banks worldwide are adjusting their monetary policies to balance inflation control with economic growth. In India, the **government and the Reserve Bank of India (RBI)** have taken **proactive steps** to mitigate inflationary pressures, particularly in food prices

### GLOBAL OVERVIEW OF INFLATION TRENDS

- **Global Inflation Surge in 2022:** Inflation **peaked globally at 8.7% in 2022**, driven by supply chain disruptions and geopolitical tensions, such as the Ukraine crisis. This surge significantly impacted the cost of goods and services worldwide.
- **Inflation Moderation in 2024:** Inflation rates are **expected to moderate globally to 5.7% in 2024**, indicating a reduction in pressure despite lingering challenges in certain sectors.

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- **India's Inflation Trend:** In India, **retail inflation eased from 5.4% in FY24 to 4.9% in FY25** (April-December). However, food prices remain a challenge due to their substantial weight in the consumer price index (CPI).

## ROLE OF FOOD INFLATION IN RETAIL INFLATION IN INDIA

Food inflation plays a crucial role in India's overall inflation rate, as **food accounts for nearly 40% of the CPI**. Fluctuations in food prices can heavily influence retail inflation.

- **Food Price Volatility:** The rise in food prices, particularly for select commodities like cereals, vegetables, and oils, has been a major contributor to headline inflation. However, food inflation is not uniform across all items.
- **Consumer Food Price Index (CFPI):** This index tracks food inflation specifically and remains a key indicator of overall inflationary trends in India.

## GLOBAL INFLATION TRENDS

### Global Resilience Amid Tightening Monetary Policies

- **Monetary Tightening by Central Banks:** Central banks worldwide have increased interest rates to cool inflation, especially in developed economies. Despite these efforts, the global economy has shown resilience with steady output growth.

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- **Impact on Inflation:** Tight monetary policies have had positive effects in reducing inflationary pressures across many countries, reflecting successful disinflationary trends.

### Decline in Core Inflation

- **Core Inflation Overview:** Core inflation, **which excludes volatile categories like food and energy**, has declined globally due to falling international commodity prices.
- **Impact of Policy Measures:** Monetary policy interventions, particularly interest rate hikes, have played a critical role in stabilizing prices and preventing further inflation escalation.

### Food Inflation Trends: Global Easing with Divergence in Emerging Economies

- **Global Food Inflation Decline:** Global food inflation has shown a downward trend, driven by improved global supply conditions.
- **Emerging Markets Divergence:** Countries like Brazil, India, and China have experienced divergent patterns in food inflation due to adverse weather, domestic supply chain challenges, and increased local demand.

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## MCQs

1. Consider the following statements and mark the correct one:

1. PUNCH Mission aims to study the sun's corona.
2. It consists of 4 satellites launched in the Low Earth Orbit.

- (A) Only 1
- (B) Only 2
- (C) Both 1 & 2
- (D) Neither 1 nor 2

**Ans. (C)**

2. Which of the following can be affected by Solar Winds?

1. Communication Systems
2. GPS
3. Electricity Transmission Grids

- (A) Only 1
- (B) Only 1 & 2
- (C) All of the above
- (D) None of the above

**Ans. (C)**

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3. Consider the following Assertion & Reasoning statements and mark the correct ones:

**Assertion (A):** Algal Blooms lead to death of fishes in water bodies.

**Reasoning (R):** The bacteria present in the waterbody use the oxygen to breakdown the algae.

- (A) Both A & R are true and R is the correct explanation on A.  
(B) Both A & R are true & R is not the correct explanation of A.  
(C) A is true R is false.  
(D) A is false R is true.

**Ans. (A)**

4. Consider the following statements and mark the correct one:

1. Inflation touched its peak in 2022 and has eased in 2024 at the global & Indian level.
2. Overall inflation in India has been in permissible limits.

- (A) Only 1  
(B) Only 2  
(C) Both 1 & 2  
(D) Neither 1 nor 2

**Ans. (C)**

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