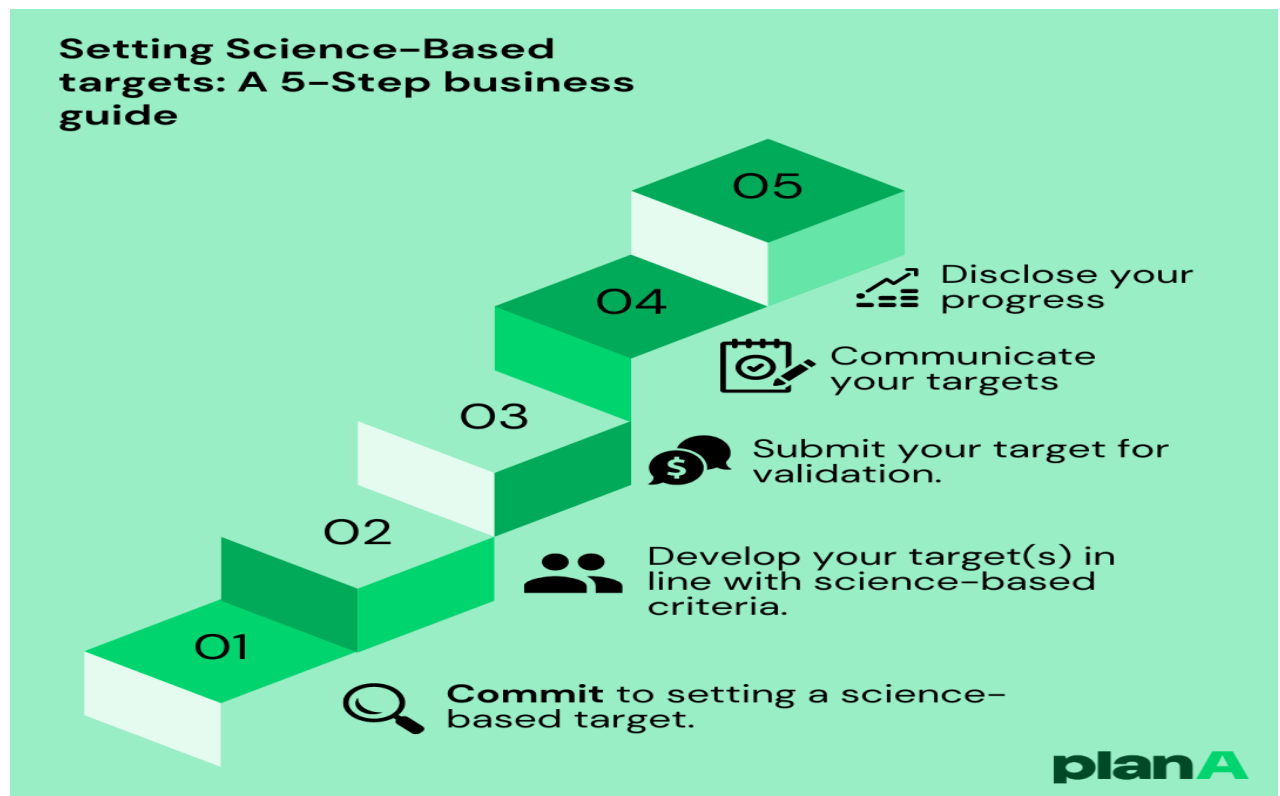


## UPSC CURRENT AFFAIRS NOTES 14-04-2024

### Science Based Targets Initiative (SBTi)

A contentious recent decision by the Science Based Targets Initiative (SBTi), permitting carbon offsetting for Scope 3 emissions of businesses with SBTi-based climate targets, has stirred controversy and skepticism.

SBTi is a global initiative established in 2015 that aims to encourage and support companies to set science-based targets (SBTs) to reduce greenhouse gas emissions and limit global warming to well below 2°C above pre-industrial levels.



The SBTi is a partnership between CDP, the United Nations Global Compact, the World Resources Institute (WRI) and the World Wide Fund for Nature (WWF).

The SBTi provides a framework and guidelines for companies to set targets that are in line with the latest climate science, including the goals of the Paris Agreement.



This involves setting targets that are consistent with limiting warming to 1.5 °C above pre-industrial levels, which is the more ambitious goal of the Paris Agreement.

Companies can have their targets independently verified and approved by the SBTi, which helps to ensure that they are aligned with the latest science and are in line with the goals of the Paris Agreement.

By setting science-based targets, companies can demonstrate their commitment to addressing climate change and reducing their carbon footprint.

The SBTi distinguishes between near- and long-term goals and commitments.

Near-term targets show how organizations intend to reduce emissions over the next 5-10 years, crucial for significant progress by 2030 and a prerequisite for net zero targets.

Long-term targets indicate how organizations need to reduce their emissions to achieve net zero, according to the criteria of the SBTi Corporate Net-Zero Standard, by 2050 at the latest (2040 for the energy sector).

**SBTi oversees the SBTi Net-Zero Standard, a pioneering framework for corporate net-zero target establishment.**

It is the world's only framework for corporate net-zero target setting in line with climate science.

It provides the guidance and tools companies need to set science-based net-zero targets.

## METHANOL

Health officials in the United States have recalled several lots of hand sanitisers and aloe gels over the risk of methanol exposure.

The Food and Drug Administration recently announced that 40 lots of Aruba Aloe Hand Sanitizer Gel Alcohol 80% and Aruba Aloe Alcoholada Gel were recalled as they contain “alcohol denatured with methanol.”

**The FDA said in a notice that methanol can be highly toxic.**

Methanol, also known as methyl alcohol or wood alcohol, is a simple chemical compound with the formula CH<sub>3</sub>OH.



It is the simplest alcohol, consisting of a methyl group (-CH<sub>3</sub>) linked to a hydroxyl group (-OH).

Methanol is a colorless, volatile, flammable liquid with a characteristic odor.

It is miscible with water and many organic solvents.

### **Properties of Methanol:**

**Physical Properties:** Methanol is a polar liquid at room temperature, with a boiling point of 64.7°C and a melting point of -97.6°C.

**Chemical Properties:** It is a primary alcohol, undergoing typical alcohol reactions such as oxidation to form formaldehyde and further oxidation to form formic acid.

### **Uses of Methanol:**

**Fuel:** Methanol is used as a fuel or fuel additive, particularly in racing cars, where it is known as "methanol fuel" or "racing fuel." It is also being explored as a potential alternative fuel for internal combustion engines and fuel cells.

**Chemical Synthesis:** Methanol serves as a key building block in the synthesis of numerous chemicals, including formaldehyde, acetic acid, methyl tert-butyl ether (MTBE), and dimethyl ether (DME).

**Solvent:** Due to its polar nature, methanol is used as a solvent in various industrial processes, such as in the production of resins, paints, and pharmaceuticals.

**Antifreeze:** Methanol is sometimes used as an antifreeze in windshield washer fluid and automotive cooling systems, although its use is declining due to safety concerns.

**Biodiesel Production:** Methanol is employed in the transesterification process to produce biodiesel from vegetable oils or animal fats.

### **Production Methods:**

**Natural Sources:** Methanol can be produced naturally in small quantities through the anaerobic metabolism of certain bacteria, as well as in the decomposition of organic matter.



**Synthetic Production:** The primary method for commercial methanol production is through the catalytic conversion of carbon monoxide and hydrogen, known as the synthesis gas or syngas process. This process typically utilizes natural gas, coal, or biomass as the source of carbon monoxide and hydrogen.

### **Safety Considerations:**

**Flammability:** Methanol is highly flammable and should be handled with caution. Its vapors can form explosive mixtures with air.

**Toxicity:** Methanol is toxic if ingested, inhaled, or absorbed through the skin. It metabolizes into formaldehyde and formic acid in the body, leading to potential organ damage, blindness, and even death.

**Ventilation:** Adequate ventilation is crucial when working with methanol to prevent the buildup of vapors, which can pose health and safety risks.

**Storage:** Methanol should be stored in tightly sealed containers away from heat, sparks, or open flames to prevent the risk of fire.

### **Environmental Impact:**

**Greenhouse Gas Emissions:** While methanol itself burns more cleanly than gasoline, its production process may contribute to greenhouse gas emissions, depending on the source of feedstock used.

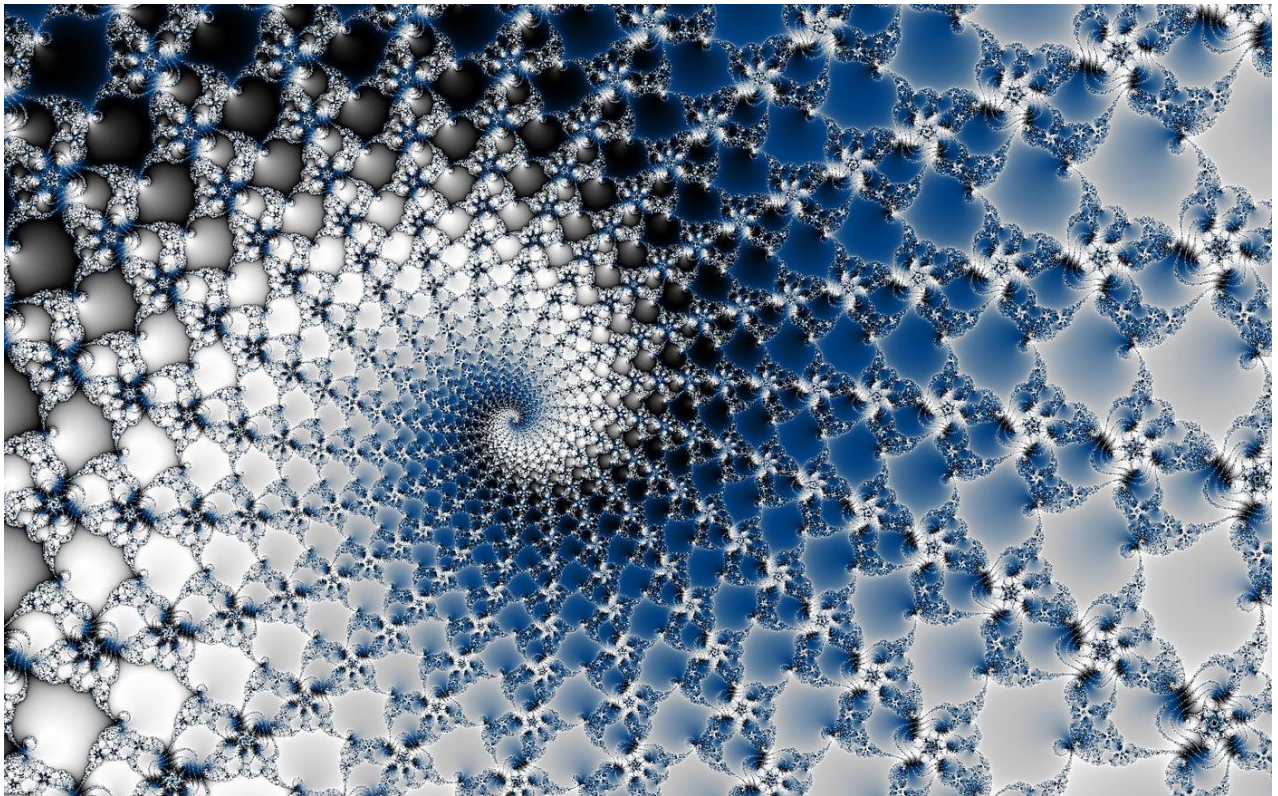
**Water Pollution:** Spills of methanol can contaminate water sources, posing risks to aquatic life and ecosystems.

**Renewable Methanol:** Efforts are underway to produce methanol from renewable sources, such as biomass or carbon dioxide captured from industrial processes or the atmosphere, to reduce its environmental impact.

## **FRACTALS**

A discovery led by researchers from the Max Planck Institute in Marburg and Philipps University in Marburg has unveiled the first regular molecular fractal found in nature.





This discovery challenges previous notions about molecular structures and sheds light on the intricate complexities of biological evolution.

The study, published in *Nature*, highlights the accidental emergence of a microbial enzyme, citrate synthase from a cyanobacterium, that forms a pattern known as the Sierpinski triangle—a remarkable example of self-similarity at the molecular level.

### **Background**

Fractals, characterized by repeating patterns across scales, are rare in nature but are found in various structures such as snowflakes, fern leaves, and romanesco cauliflower heads.

While molecules exhibit a degree of regularity, they typically appear smooth at a distance, lacking the self-similarity observed in fractals.

### **What are Fractals?**

Fractals are complex geometric shapes that exhibit self-similarity at different scales.

This means that when you zoom into a fractal, you'll see smaller copies of the overall shape, each with similar patterns to the whole.



Fractals often possess infinite detail, meaning you can continue to zoom in and discover new patterns, albeit at diminishing scales.

### Properties of Fractals:

**Self-Similarity:** Fractals exhibit self-similarity, meaning that parts of the fractal resemble the whole at different scales.

**Fine Structure:** Fractals possess intricate, detailed structures at all scales, with complexity increasing as you zoom in.

**Non-Integer Dimension:** Unlike regular geometric shapes, fractals can have non-integer dimensions, such as fractional or fractal dimensions.

### Types of Fractals:

**Deterministic Fractals:** These fractals are generated using mathematical formulas or algorithms, such as the Mandelbrot set or the Koch snowflake.

**Random Fractals:** Also known as stochastic fractals, these are generated using randomness or statistical processes, such as fractal landscapes or Brownian motion.

### Applications of Fractals:

**Computer Graphics:** Fractals are widely used in computer graphics to generate realistic natural phenomena like mountains, clouds, and foliage.

**Data Compression:** Fractal compression algorithms exploit the self-similarity of images to achieve high compression ratios.

**Fractal Antennas:** These antennas utilize fractal geometry to achieve compact size and multiband performance in wireless communication systems.

**Finance:** Fractal patterns are observed in financial markets, with techniques like fractal analysis used for market prediction and risk assessment.

**Biological Modeling:** Fractals are employed to model and understand complex structures in biology, such as branching patterns of blood vessels and lung airways.

**Art and Design:** Many artists and designers use fractals as inspiration for creating visually stunning artworks and patterns.



## Mercenary spyware

Months after several Opposition leaders claimed that they received messages warning of "state-sponsored" hackers trying to access their iPhones, the tech giant has sent out a "mercenary spyware" alert to its users in 92 countries, including India.



### Mercenary Spyware Definition

Mercenary spyware refers to surveillance software developed and sold by private companies to various entities, including governments and corporations. These companies typically market their products as tools for law enforcement, intelligence agencies, or cybersecurity firms to monitor individuals or organizations.

### Features

**Target Audience:** These companies typically market their products to governments, law enforcement agencies, intelligence organizations, and corporations.

**Capabilities:** Mercenary spyware is highly sophisticated and can infiltrate various devices, including smartphones, computers, and digital systems.



**Stealthy Installation:** It's often designed to be installed on target devices without the knowledge or consent of the individuals being monitored.

**Data Collection:** Once installed, the spyware can collect a wide range of data, including text messages, emails, call logs, browsing history, and location information, and can even activate microphones and cameras for audio and video surveillance.

### **Example:**

One prominent example is Pegasus, developed by the Israeli company NSO Group, which gained notoriety for its alleged use by governments to target journalists, activists, politicians, and others.

Concerns surrounding mercenary spyware:

**Privacy Violations:** Mercenary spyware enables extensive surveillance, including access to personal communications, browsing history, and location data, violating individuals' privacy rights.

**Abuse of Power:** Governments and other entities can abuse mercenary spyware to target journalists, activists, and political opponents, stifling freedom of speech and dissent.

**Lack of Accountability:** The secretive nature of the surveillance industry makes it difficult to hold companies accountable for the misuse of their products, leading to impunity for human rights abuses.

**Security Risks:** Exploiting vulnerabilities in digital systems to install spyware poses security risks, as these vulnerabilities can be exploited by malicious actors, leading to data breaches and cyberattacks.

**Ethical Implications:** The use of mercenary spyware raises ethical questions about the balance between national security and individual rights, highlighting the need for transparent and ethical guidelines governing surveillance practices.

### **Case of Pegasus Spyware**

"Pegasus" is a highly advanced mercenary spyware developed by NSO Group, an Israeli company. In a notorious case, it was allegedly used by various governments to target journalists, activists, and political figures worldwide. In 2019, it was revealed that Pegasus had exploited WhatsApp's vulnerabilities to infect devices with malware, allowing extensive surveillance without user consent. Targets reported their phones being remotely monitored, with access to





private messages, calls, and even camera and microphone activation. The case sparked international outcry, leading to investigations into NSO Group's practices and calls for tighter regulation of the surveillance industry to protect privacy and human rights.

## **Climate change ruling by the European Court of Human Rights**

Human rights court sided with a group of 2,000 Swiss women all over the age of 64 who had sued their government for violating their human rights by failing to do enough to combat the adverse effects of climate change.

### **Background of the Case:**

2,000 Swiss women over 64 years old sued the Swiss government in 2016 for inadequate climate policies.

They argued that climate change poses a threat to their right to life and health, particularly due to their vulnerability to heat-related illnesses.

The verdict is part of a broader trend of increasing climate litigation worldwide.

### **Court's Verdict:**

The European Court of Human Rights (ECHR) ruled in favor of the women, stating that Article 8 of the European Convention on Human Rights encompasses the right to protection from serious adverse effects of climate change.

The court found Switzerland in violation of the convention for failing to enact sufficient laws and meet greenhouse gas emission goals.

### **Significance of the Ruling:**

The ruling obliges the Swiss government to update its climate policies.

While the court cannot dictate specific policies, it emphasises the need for consistency with climate science.

The ruling has implications beyond Switzerland, as it applies to 46 member states, potentially encouraging similar cases in other countries.

The verdict highlights the role of various groups, including children, women, indigenous peoples, and local communities, in holding governments and companies accountable for climate-related damages.

The ruling reinforces the idea that ambitious climate action is a requirement under human rights law.

### **Global Trends in Climate Litigation:**

There has been a rise in climate-related cases globally, with 2,180 cases filed in 65 jurisdictions as of December 2022.

In Montana, USA, young plaintiffs won a case against their state government for neglecting climate change while approving fossil fuel projects.

Similar cases have been filed in India, demonstrating a global push for greater action on climate change through legal means.

## **Hydrogel**

Researchers at the Indian Institute of Science (IISc) have designed a sustainable hydrogel to remove microplastics from water.

### **About Hydrogel**

It is a three-dimensional network composed of hydrophobic polymers synthesized by crosslinking water-soluble polymers.

Hydrogels can retain a large quantity of water within their network without disturbing their original structure. This imparts flexibility and swelling properties to the hydrogel structures.

It is a “smart” material that can change its structure in response to its environment, such as the local temperature, pH, salt or water concentration.

### **Key facts about the sustainable hydrogel**

It is designed by the researchers has a unique intertwined polymer network that can bind the contaminants and degrade them using UV light irradiation.

It consists of three different polymer layers – chitosan, polyvinyl alcohol and polyaniline – intertwined together, making an interpenetrating polymer network (IPN) architecture.

The team infused this matrix with nanoclusters of a material called copper substitute polyoxometalate (Cu-POM). These nanoclusters are catalysts that can use UV light to degrade the micro plastics.

The combination of the polymers and nanoclusters resulted in a strong hydrogel with the ability to adsorb and degrade large amounts of microplastics.

The hydrogel was found to be highly efficient – it could remove about 95% and 93% of two different types of microplastics in water at near-neutral pH (~6.5).

### **What is a Micro plastic?**

It is tiny plastic debris smaller than 5 mm in length.

There are two types of microplastics as follows

**Primary microplastics :** These are tiny particles (solid plastic particles of less than one millimeter in their largest dimension) intentionally designed for commercial use, such as cosmetics, nurdles i.e., plastic pellets used in industrial manufacturing and fibers from synthetic fabrics such as nylon.

**Secondary microplastics :** These are formed from the degradation of large plastic objects such as bottles, fishing nets and plastic bags. It is caused by exposure to the environment, such as radiation from the sun, wind and ocean waves.

## **Global Forest Watch (GFW)**

India has lost 2.33 million hectares of tree cover since 2000, according to the latest data from the Global Forest Watch monitoring project.



### **About Global Forest Watch (GFW)**



It is an open-source web application to monitor global forests in near real-time using satellite data and other sources.

It is a project of the Washington-based nonprofit research organization, the World Resources Institute (WRI). Most of the data is compiled by the University of Maryland researchers.

It is free and simple to use, enabling anyone to create custom maps, analyze forest trends, subscribe to alerts, or download data for their local area or the entire world.

It refers to tree cover when talking about forest extent, loss, and gain. Tree cover is a convenient metric for monitoring forest change because it is easily measurable from space using freely available, medium-resolution satellite imagery.

### **Highlights of the GFW's annual forest loss data:**

The loss of primary forests—those untouched by people and sometimes known as old-growth forests – in the tropics declined 9% last year compared to 2022.

The world last year lost about 37,000 square kilometers (14,000 square miles) of tropical primary forest, an area nearly as big as Switzerland.

Brazil, the Democratic Republic of Congo, and Bolivia topped the ranking of tropical countries with the most primary forest losses.

### **Deforestation globally rose by 3.2% in 2023.**

India has lost 2.33 million hectares of tree cover since 2000, equivalent to a six percent decrease in tree cover during this period.

The country lost 4,14,000 hectares of humid primary forest (4.1 percent) from 2002 to 2023, making up 18 per cent of its total tree cover loss in the same period.

Between 2001 and 2022, forests in India emitted 51 million tons of carbon dioxide equivalent a year and removed 141 million tons of carbon dioxide equivalent a year. This represents a net carbon sink of 89.9 million tons of carbon dioxide equivalent a year.

An average of 51.0 million tons of carbon dioxide equivalent per year was released into the atmosphere as a result of tree cover loss in India.





The data showed that 95 percent of the tree cover loss in India from 2013 to 2023 occurred within natural forests.

The GFW data showed that five states accounted for 60 percent of all tree cover losses between 2001 and 2023.

Assam had the maximum tree cover loss at 324,000 hectares, compared to an average of 66,600 hectares. Mizoram lost 312,000 hectares of tree cover, Arunachal Pradesh 262,000 hectares, Nagaland 259,000 hectares, and Manipur 240,000 hectares.

## Doxxing

In recent, doxxing incidents are increasing over the internet across the globe.

The word “doxxing” is derived from “dropping dox”.

It is a form of online harassment involving the publication of personal information about an individual without their consent.

This information can include details such as their full name, home address, telephone number, place of work, and other sensitive information.

Doxxing is often carried out to expose, threaten, or intimidate someone and can lead to severe consequences, such as physical harm, stalking, or loss of employment.

Such information is usually obtained through illegal methods such as hacking or theft.

Use strong passwords that are not repeated across platforms, and set up multi-factor authentication where possible.

Avoid posting photos that reveal your neighbourhood, house facade, house keys, identifiable landmarks etc.

Reporting through the National Cyber Crime Reporting Portal online etc.

Hacking (also called cyber hacking) is the use of unconventional or illicit means to gain unauthorized access to a digital device, computer system or computer network.