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6th December, 2023

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PLASTIC FREE WORLD- UNEP

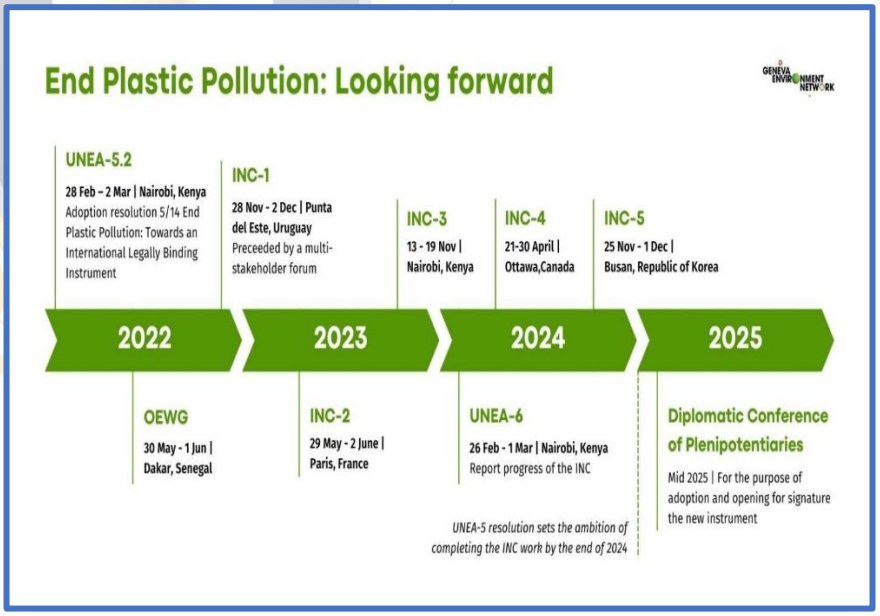
SOURCE: THE HINDU

WHY IN NEWS?

- *The **Intergovernmental Negotiating Committee (INC),** operating under **the United Nations Environment Programme**, recently convened in **Nairobi for its third round of negotiations** aimed at crafting an international **legally binding instrument** to **combat plastic pollution** globally.*
- *The INC, mandated by UN Environment Assembly Resolution 5/14, seeks to deliver a **global plastics treaty by 2025.***
- *Unlike the preceding round (INC-2), INC-3 moved beyond procedural debates**, focusing on the substantive contents of the proposed treaty.***

INC AND THE EVOLUTION OF THE GLOBAL PLASTIC TREATY:

- **Formation and Purpose:**
  - ✓ **UNEA established in 2012** for global environmental governance.
  - ✓ INC, **led by UN member states**, tasked with negotiating a global treaty on plastic pollution.
- **UNEA Meetings and Resolutions:**
  - ✓ UNEA meetings every two years to set global environmental priorities.
  - ✓ **Plastics discussed since 2014**, focusing on downstream issues.
  - ✓ UNEA 5.2 resolution marked a milestone, calling for a **legally binding instrument to "End Plastic Pollution."**



- **Evolution of the Idea:**
  - ✓ UNEA-3 (2017) established an expert group on marine litter.
  - ✓ **India's call for a global single-use plastic ban at UNEA 4 in 2019.**
  - ✓ UNEA 5.2 adopted a historic resolution to address plastic pollution comprehensively.
- **Establishment of OEWG and INC:**
  - ✓ UNEA 5.2 resolution called for **OEWG and INC formation.**
  - ✓ **OEWG met in 2022**, laying the groundwork for INC meetings.
- **Fast-Tracked Timeline:**
  - ✓ INC meetings held four times over two years to finalize the treaty text.
  - ✓ **INC-5 in 2025 to decide on ratification**, potentially making it the fastest-developed text for an environmental treaty.

KEY POINTS FROM INC-3 MEETINGS:

- **Treaty Modifications:**
  - ✓ INC-3 focused on **developing a global plastics treaty to combat pollution**, following UN Environment Assembly Resolution 5/14.
  - ✓ **Negotiations centered around the 'zero draft' text**, with discussions on core obligations and control measures.
- **Controversial Treaty Elements**:
  - ✓ Disagreements among member states **included core obligations on primary polymer production, chemicals, plastics, trade, and financial mechanisms**.
  - ✓ Divergence on the treaty's objective and scope, with a group advocating **for alignment with sustainable development goals.**
- **Industry Influence and Production Reduction:**
  - ✓ **Industry influence** was evident, with **increased lobbyists at INC-3.**
  - ✓ **Controversy over reducing primary polymer production** due to implications for the industry.
- **Financial Mechanism and Trade Restrictions:**
  - ✓ **Financial mechanisms proposed in the zero draft** faced opposition from like-minded countries.
  - ✓ **Disagreements on trade restrictions**, with the bloc contending it infringes on national sovereignty.
- **Stalling and Setbacks:**
  - ✓ Stalling in discussions led **to a failure to adopt the mandate for the first draft**.
  - ✓ The closed-door meeting on intersessional work resulted in **no consensus, causing a setback before INC-4.**

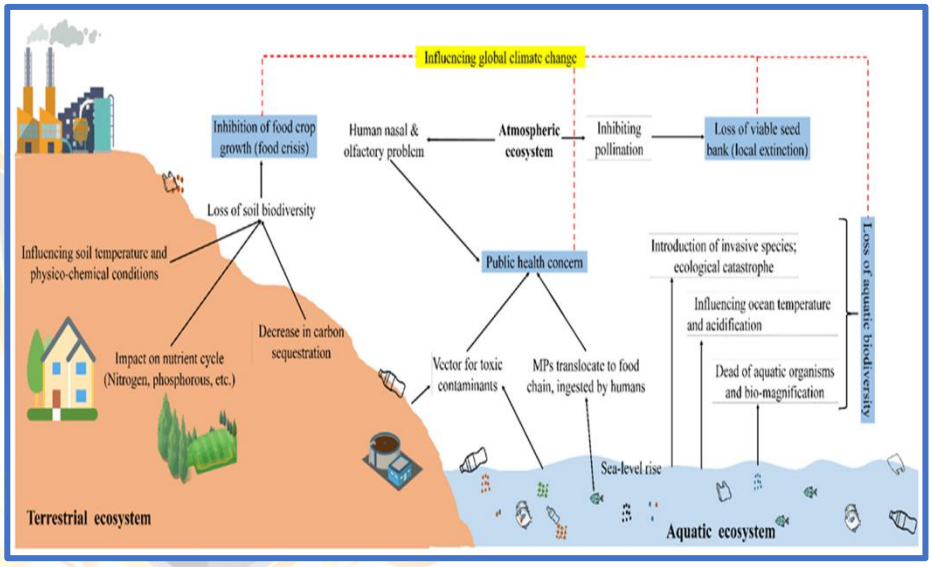
UNDERSTANDING OF PLASTIC POLLUTION:

- **Definition of Plastic Pollution:**
  - ✓ Plastic, a **synthetic organic polymer** derived from **petroleum,** finds wide applications in various fields.
  - ✓ **Non-biodegradable,** it persists in the environment for hundreds or even thousands of years.
- **Causes of Plastic Pollution:**
  - ✓ Plastic pollution results from the **accumulation of plastic waste in the environment.**
  - ✓ Primary plastic wastes include items **like cigarette butts and bottle caps**.
- **Types of Plastic Wastes:**
  - ✓ Primary plastics, like cigarette butts and bottle caps, contribute to plastic pollution.
  - ✓ Secondary plastics form through the **degradation of primary ones over time.**
- **Scale of Plastic Production and Waste:**
  - ✓ The **UN reports** an annual **global plastic production exceeding 300 million tons**.
  - ✓ **India generates 46 million tonnes** of plastic waste **each year**, with **40% remaining uncollected.**
- **Usage and Impact of Plastic:**
  - ✓ **About 43% of India's plastic waste is** utilized for packaging, mainly single-use plastic.
  - ✓ Plastic pollution poses environmental challenges **due to its non-biodegradable nature**.

- **Unexpected Presence:**
  - ✓ Mariana Trench and Mt. Everest both **host plastic debris despite their remote locations**.
  - ✓ Plastics, **comprising 85% of marine waste**, are a pervasive and harmful fraction of marine litter.
- **Widespread Marine Litter**:
  - ✓ **Marine litter,** escalating **along coastlines**, **mid-ocean currents**, and remote islands, poses a threat.
  - ✓ From polar regions to deep-sea trenches, **plastics harm marine life and ecosystems**.
- **Decades of Plastic Infiltration:**
  - ✓ **Over 70 years, plastic, versatile yet pervasive**, infiltrated every corner of the planet.
  - ✓ Unnecessary **single-use plastics contribute to unmanaged waste**, impacting lakes, rivers, and coastal areas.

IMPACT OF PLASTIC POLLUTION:

- **Environmental Degradation:**
  - ✓ Plastics, **non-biodegradable** and persisting for centuries**, cause environmental degradation**.
  - ✓ Marine litter and adverse effects of plastic pollution **span from ecosystems to human health**.



- **Harm to Marine Life:**
  - ✓ Plastics **break down into microplastics,** posing physical and **chemical harm to marine life**.
  - ✓ Sea turtles, seabirds, and marine mammals suffer, mistaking plastics for food or getting trapped.
- **Human Health Risks:**
  - ✓ **Microplastics' pervasiveness raises concerns** about human health risks **through inhalation, ingestion, and absorption.**
  - ✓ Chemicals in plastics, like **methyl mercury and flame retardants**, are linked to health issues.
- **Inequality in Impact:**
  - ✓ **Wealthier countries producing more plastic** disproportionately affect less developed nations.
  - ✓ Recycling efforts are hindered by the global plastic **recycling rate being below 10%.**
- **Social and Economic Consequences:**
  - ✓ Developing countries, **lacking support and funds**, face intensified environmental, health, and social burdens.
  - ✓ **Women, children, waste workers, coastal communities**, and Indigenous Peoples suffer more intensely.
- **Loss of Marine Ecosystem Services:**
  - ✓ Marine plastics pollution reduces **valuable ecosystem services by at least US$500 billion** to **US$2,500 billion** annually.
  - ✓ Direct economic losses to coastal industries are significant, impacting fisheries and shipping.
- **Climate Change Connection:**

- ✓ Plastic production intensifies the climate crisis as it is predominantly derived from fossil fuels.
- ✓ Greenhouse gas emissions from plastic's lifecycle could **contribute to 19% of the Paris Agreement's total allowable emissions by 2040.**

GOVERNMENT INITIATIVES AGAINST PLASTIC POLLUTION:

- **"Clean and Green" Campaign (June 2022):**
  - ✓ The Ministry of Housing and Urban Affairs **launched a nationwide awareness campaign to discourage single-use plastics** and promote environmental improvement.
- **Plastic Waste Management Rules (2022):**
  - ✓ The Union Environment Ministry introduced rules, including the phase-out of some single-use plastics and **an increase in plastic carry bag thickness to combat plastic pollution**.
- **India Plastic Pact:**
  - ✓ Collaboration between corporations, governments, and NGOs under the **India Plastic Pact aims to transform India's linear plastics economy** into a circular one, reducing problematic plastics and creating job opportunities.

- **Targets by 2030:**
  - ✓ The Union Environment Minister introduced initiatives, including a **National Dashboard, Extended Producer Responsibility Portal,** a grievance redress app, and **a monitoring module for Single-Use Plastic (SUP) elimination** and plastic waste management.
- **Innovative Solutions by MSME and Education Sector:**
  - ✓ **Khadi and Village Industries Commission (KVIC) patented plastic-mixed handmade** paper as part of Project REPLAN, reducing plastic waste.
  - ✓ Thiagarajar College of Engineering secured a patent for **plastone blocks and tiles made from recycled plastics,** offering sustainable alternatives in construction.

WAY FORWARD:

- **Strengthened Waste Management:**
  - ✓ Invest in robust waste management systems **globally to collect, recycle, and reuse plastic effectively.**
- **Circular Economy Practices:**
  - ✓ Promote **sustainable consumption and production** across the plastic value chain, encouraging the use of recycled materials.
- **Consumer Education and Engagement:**
  - ✓ L**aunch awareness campaigns to educate consumers** about the environmental impact of plastic pollution and inspire responsible choices.
- **Phasing Out Problematic Plastics:**
  - ✓ Implement **measures to gradually eliminate unnecessary** and problematic **single-use plastics**, encouraging alternatives.
- **Effective Monitoring and Governance:**

- ✓ Establish rigorous monitoring systems to **track plastic sources, quantities, and environmental fate**.
- ✓ Strengthen and **enforce governance and regulations** at all levels for effective plastic pollution management.

➢ **Global Collaboration and Agreements:**

- ✓ Actively **participate in global agreements** and conventions related to marine pollution, climate change, and sustainable ocean use.
- ✓ **Foster international collaboration to address the global nature** of **plastic pollution** and share best practices.

GLOBAL POSITIONING SYSTEM (GPS)

SOURCE: THE HINDU

WHY IN NEWS?

*The **Global Positioning System (GPS)** has garnered recent attention due to its **continued impact on various aspects of daily life and global operations**. Several factors contribute to its **current relevance**:*

- ***Ongoing Technological Advancements**:*
  - ✓ *Continuous updates and **advancements in GPS technology** make it a subject of interest.*
  - ✓ ***Innovations in satellite constellations**, signal accuracy, and new applications contribute to its evolving role.*
- ***Pervasive Global Use:***
  - ✓ *The increasing global reliance on **GPS for navigation**, ranging from personal devices to critical infrastructure, keeps it in the news.*
  - ✓ *Sectors like **agriculture, logistics, and telecommunications** rely heavily on GPS for efficient functioning.*
- ***Geopolitical Significance:***
  - ✓ *GPS has **geopolitical implications**, especially as various countries, **including the U.S., Russia, China, and the European Union,** develop and enhance their **own satellite navigation systems**.*
  - ✓ *Collaborations and competitions in **space-based navigation technologies** contribute to its news coverage.*
- ***Integration with Everyday Life:***
  - ✓ ***The integration of GPS into everyday technologies**, such as smartphones, cars, and wearables, ensures its consistent presence in news discussions.*
  - ✓ *Its impact on **urban planning, disaster risk estimation**, and scientific studies remains a noteworthy topic.*

UNDERSTANDING GPS: KEY COMPONENTS AND FUNCTIONS

- **GPS Origin and Development:**
  - ✓ Initiated by **the U.S. Department of Defense in 1973,** the Global Positioning System (GPS) aimed **to provide precise location information**.
  - ✓ Launched **its first satellite in 1978,** marking the beginning of a revolutionary navigation system.
- **Satellite Constellation:**
  - ✓ The modern **GPS constellation comprises 24 satellites** orbiting the Earth in six orbits.

- ✓ **Each satellite completes two orbits daily**, ensuring continuous global coverage.
- ✓ Positioned **approximately 20,200 km above the Earth**, with four satellites in each orbit at all times.

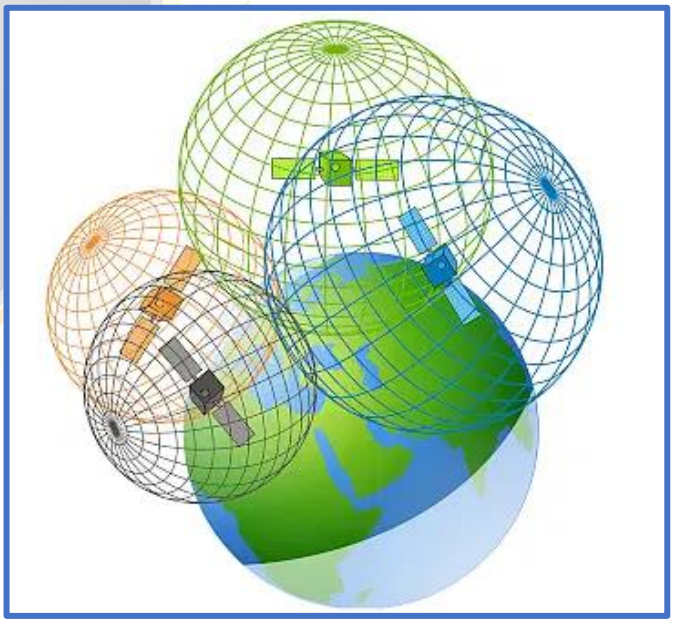
➢ **Standard Positioning Service (SPS):**
- ✓ The **SPS performance standard, last updated in April 2020**, guides application developers and users globally.
- ✓ Ensures users **understand what to expect from the GPS system** in terms of accuracy and reliability.

➢ **User Segment and Applications:**
- ✓ Encompasses various sectors and applications:
- ✓ **Agriculture, construction, surveying, logistics, telecommunications, power transmission**, search and rescue, air travel, meteorology, seismology, and military operations.
- ✓ In 2021, an **estimated 6.5 billion Global Navigation Satellite System (GNSS)** devices were in use worldwide, projected **to reach 10 billion by 2031.**

➢ **Global Impact and Future Trends:**
- ✓ GPS has become **integral to daily life,** influencing navigation, c**ommunication, and various industries globally.**
- ✓ Ongoing advancements **and increasing device installations indicate** a growing reliance on **GPS technology.**

HOW GPS FUNCTIONS: DECODING THE SATELLITE SIGNALS

➢ **Satellite Signal Broadcast:**
- ✓ GPS satellites **continuously emit radio signals containing crucial information**: orbital location, operational status, and emission time.
- ✓ Signals are **transmitted at L1 (1,575.42 MHz)** and **L2 (1,227.6 MHz) frequencies** at a rate of **50 bits per second.**



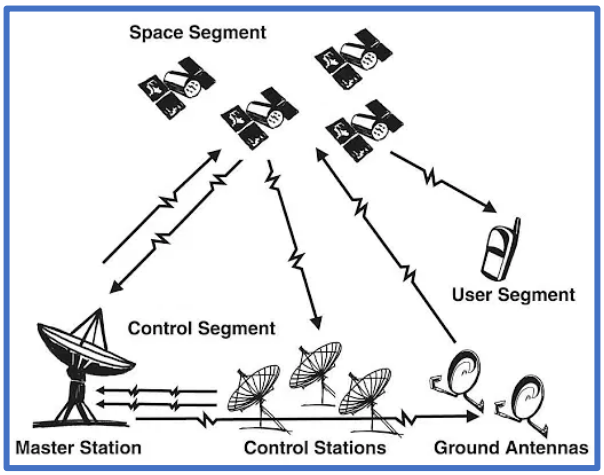
➢ **Signal Encoding and Transmission:**
- ✓ Encoded using **code-division multiple access,** allowing multiple signals in the same channel.
- ✓ ***Two encoding types:*** coarse/acquisition mode (**for civilian use, providing basic data**) and precise mode (**encrypted for military applications**).

➢ **Electromagnetic Signal Reception:**
- ✓ GPS receivers in devices such as **smartphones capture the electromagnetic signals broadcast by satellites.**

➢ **Distance Calculation:**
- ✓ The GPS receiver calculates its **precise distance from the satellite based on the speed of light**.
- ✓ Distance equals the **speed of light multiplied by the signal's travel time**.

➢ **Triangulation for Location:**
- ✓ Triangulation involves **using signals from at least four satellites.**

- ✓ The receiver determines its **location in four dimensions** (three spatial dimensions and one time dimension relative to the satellite clock).
- ✓ Achieves accurate location triangulation on the Earth's surface.



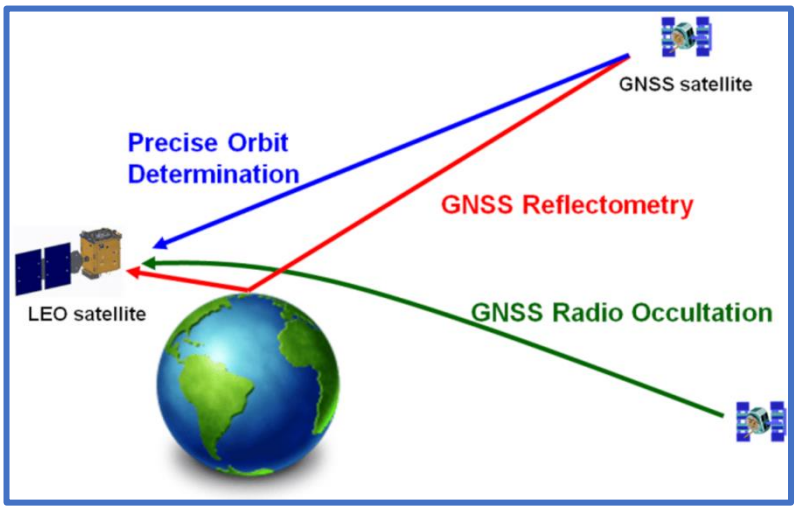
- ➢ **Adjustments for Accuracy:**
  - ✓ Corrections are applied to **ensure error-free measurements.**
  - ✓ Due to **weaker gravitational potential**, satellite onboard clocks **run 38 microseconds faster than** ground clocks, a correction dictated by the general theory of relativity.
  - ✓ The special theory of relativity necessitates adjustments for the **relative velocities of the satellite and receiver.**

INDIA'S OWN REGIONAL NAVIGATION SATELLITE SYSTEM: NAVIC

- ➢ **Evolution of NavIC:**
  - ✓ NavIC, India's **indigenous alternative to GPS**, **initiated in 2006** and **became operational in 2018.**
  - ✓ Comprises **eight satellites**, covering India **entirely and extending up to 1,500 km** beyond its borders.
- ➢ **Performance Parity with GPS:**
  - ✓ Asserted performance **equivalence of NavIC** with other **global positioning systems**.
  - ✓ Current applications include **public vehicle tracking, emergency alerts for deep-sea fishermen**, and **natural disaster data tracking**.
- ➢ **Government Push for Smartphone Integration:**
  - ✓ Government **encouragement for smartphone compatibility** with NavIC alongside GPS.
  - ✓ Reported concerns from **major tech companies like Samsung, Xiaomi, and Apple** regarding potential cost escalations and disruptions due to necessary hardware changes.
- ➢ **Advantages of NavIC:**
  - ✓ **Reduction of reliance on foreign-controlled** positioning systems susceptible to civilian suspension during crises.
  - ✓ **Enhanced accuracy** attributed to **NavIC being a domestic system**.
  - ✓ Future improvements, **including ground stations in Japan and France**, expected **to surpass GPS accuracy,** particularly in challenging terrains **like dense forests and valleys.**
- ➢ **Global Navigation Landscape:**
  - ✓ Overview of major navigation systems, including **GPS, Galileo, GLONASS, Beidou, and QZSS.**
  - ✓ Emphasis on **the strategic positioning of NavIC** to ensure superior **signal availability in diverse geographical regions** compared to GPS.

INDIA'S NAVIC & THE GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS):

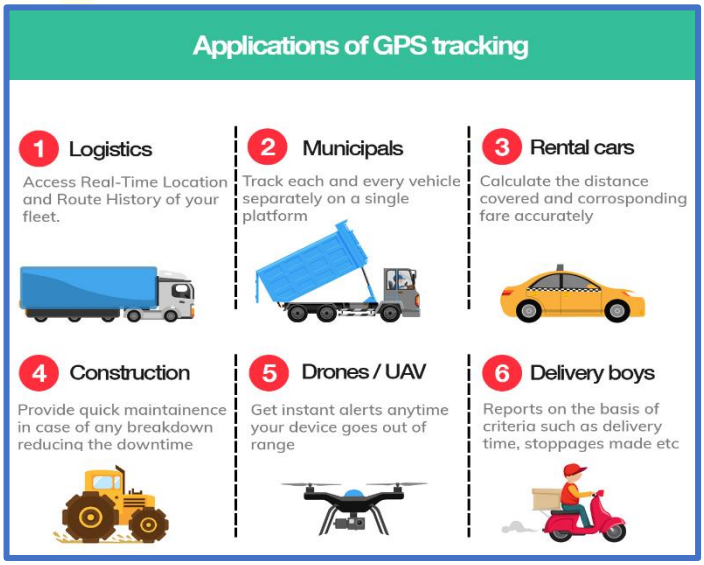
- **International Collaboration:**
  - ✓ GNSS cooperation involves countries like the **U.S., Australia, China, EU (Galileo), India (NavIC), Japan, South Korea, Russia (GLONASS), and the U.K.**
  - ✓ Regular meetings ensure **technology compatibility**, facilitated by the **International Committee on GNSS under the UN.**



- **India's Navigation Initiatives:**
  - ✓ **India developed NavIC (Navigation with Indian Constellation) as** a regional GNSS alternative.
  - ✓ NavIC's seven satellites use **rubidium atomic clocks**, **operate in L5, S, and L1 bands**, with messaging capabilities**.**
- **Ground Control and Facilities:**
  - ✓ **NavIC's master control facilities in Hassan** and **Bhopal** ensure accurate navigation.
  - ✓ **GAGAN system, jointly developed by ISRO** and AAI, focuses on civil aviation safety in Indian airspace.
- **Frequency Enhancement for NavIC:**
  - ✓ ISRO's decision to **introduce L1 frequency enhances NavIC's civilian applications**.
  - ✓ **L1 band's compatibility promotes integration** into a wide range of devices, increasing civilian use**.**
- **India's GNSS Independence Vision:**
  - ✓ India aims for **GNSS independence** to reduce reliance on **foreign-controlled systems**.
  - ✓ **NavIC's accuracy and performance advantages**, especially in **challenging terrains, reinforce its strategic importance.**

APPLICATIONS OF GPS: KEY POINTS

- **Agriculture:**
  - ✓ **Precision farming** utilizing GPS and GIS.
  - ✓ **Field mapping**, **soil sampling**, tractor guidance.
  - ✓ Enhances productivity and resource conservation**.**
- **Aviation:**
  - ✓ Enables **three-dimensional position determination**.
  - ✓ Area navigation for user-preferred routes.
  - ✓ **Efficient air routes, improved airport approaches**, and reduced delays.
- **Environment:**
  - ✓ Supports comprehensive environmental analysis.
  - ✓ Efficiently recognizes environmental patterns and trends.



- ✓ Assists **in tracking disasters, monitoring seismic activities**, and preserving endangered species.

➢ **Marine:**
- ✓ Provides **fast and accurate navigation for mariners**.
- ✓ Improves efficiency in traffic routing and port operations.
- ✓ Enhances safety and security for vessels.

➢ **Public Safety & Disaster Relief:**
- ✓ **Critical in disaster management** and **rescue operations**.
- ✓ Facilitates precise location awareness for landmarks and emergency resources.
- ✓ Proven importance in **real-time situations like Tsunami,etc**.

➢ **Surveying:**
- ✓ Widely used for mapping telephone lines, **fire hydrants, and server lines**.
- ✓ Enables fast and **efficient surveying with GPS technology.**

➢ **Mobile Phones:**
- ✓ Efficient feature in **smartphones for navigation** and various applications.
- ✓ Improves service provider **efficiency and signal strength feedback.**

➢ **Robotics:**
- ✓ **Aids robots** in navigation and task performance**.**

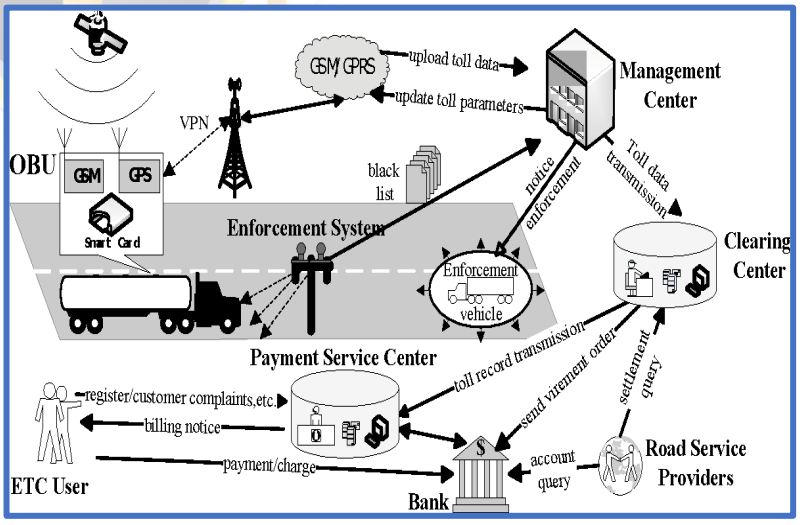
➢ **Military Purpose:**
- ✓ Initially developed for military use.
- ✓ **Used in tracking targets, guiding missiles**, and projectiles**.**

➢ **Miscellaneous:**
- ✓ Emergency **positional information for individuals** with mobile devices.
- ✓ Enhances **flood prediction, storm tracking**, and earthquake anticipation.
- ✓ **Supports forest fire containment using GPS** combined with infrared scanners.

CHALLENGES OF GPS-BASED TOLLING IMPLEMENTATION:

➢ **Logistical Challenges:**
- ✓ **Installation of GPS devices** and **software on existing vehicles**.
- ✓ Building complex frameworks to **prevent inaccuracies.**

➢ **Implementation Requirements:**
- ✓ Need for **GPS-based devices (On-Board Unit - OBU**), applications, and power sources.
- ✓ Modern vehicles with **built-in GPS vs. older vehicles requiring OBU** installation.



➢ **Cost Implications:**
- ✓ Additional expenditure for users, especially for older vehicles.
- ✓ **Costs associated with GPS devices**, cellular connectivity, and software.

➢ **Accuracy Concerns:**
- ✓ Potential miscalculation of **toll due to GPS accuracy issues**.
- ✓ Requirement **for highly accurate mapping and geo-fencing**.

➢ **GPS Accuracy and Geo-Fencing:**

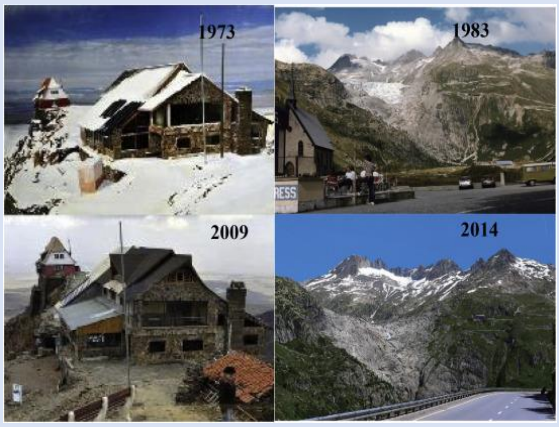
- ✓ GPS operators' **guaranteed accuracy of 15 meters** may not be sufficient.
- ✓ Potential challenges in distinguishing between service roads and highways.

- **Role of NaviC Satellites:**
  - ✓ **ISRO's NaviC satellites** may enhance accuracy.
  - ✓ Increased number of satellites for improved **time-to-fix accuracy**.
- **Data Privacy Concerns:**
  - ✓ Privacy concerns related to **tracking users and vehicles**.
  - ✓ Critical need for clear policies around data governance and anonymization.
- **Consent Management:**
  - ✓ Importance of managing user consent processes.
  - ✓ **Automation of consent processes** to ensure user security.
- **Legal Considerations:**
  - ✓ Adoption of **suitable measures and modalities for data requests**.
  - ✓ Certification process **for GPS devices to meet requirements**.
- **Global Precedents:**
  - ✓ Reference to **GPS-based tolling implemented in countries** like **Germany and Singapore**.
  - ✓ Consideration of global experiences in the implementation process.

WAY FORWARD:

- **Implementation Framework:**
  - ✓ **Develop a clear and user-friendly implementation** framework to ease the transition.
  - ✓ Address the **need for standardization and guidelines** for a seamless rollout.
- **Affordability and Accessibility:**
  - ✓ Explore subsidies or incentives to **make GPS devices** more affordable for users.
  - ✓ **Encourage partnerships with private entities** for cost-effective solutions.
- **Technological Solutions:**
  - ✓ **Leverage advancements** such as ISRO's NaviC satellites to enhance GPS accuracy.
  - ✓ Invest in research and development for improved GPS technologies.
- **Data Privacy Measures:**
  - ✓ **Establish robust data governance policies** ensuring anonymization and user consent.
  - ✓ **Automate consent processes** and prioritize user security in data handling.
- **Certification and Regulation:**
  - ✓ Implement a **certification process for GPS devices**, ensuring compliance with standards.
  - ✓ Facilitate domestic manufacturing, **promoting a robust and diverse market for GPS trackers**.

PRELIMS POINTERS:

TOPIC	DISCRIPTION
Glaciers shrank 1 m a year in a decade: WMO	**WHY IN NEWS?** ❖ **The 2011–2020 decade**, despite being **the warmest recorded**, experienced the **lowest deaths from extreme events**. ❖ Credited to enhanced **early warning systems globally.** ❖ India specifically improved **forecasting, aiding preparedness and evacuation during cyclones.**  **KEY FINDINGS OF THE REPORT** ❖ **Environmental Milestones:** ☛ **Depleted ozone hole** showed visible recovery during this period. ☛ Global glaciers **thinned by about 1 meter per year** on average. ☛ Greenland and Antarctica **lost 38% more ice** than the previous decade. ☛ **Mention of the 2021 Uttarakhand** rock-avalanche triggered by **a Nanda Devi glacier breach.** ❖ **Climate Change Impact and Risks:** ☛ **Human-induced climate change** significantly increased risks from **extreme heat events.** ☛ Heatwaves resulted in the **highest number of human casualties**. ☛ **Tropical cyclones** caused the most **economic damage.** ❖ **Financial Trends:** ☛ **Public and private climate finance** nearly doubled during the decade. ☛ Urgent need for a **seven-fold increase** by the decade's end to meet climate objectives**.** ❖ **Call for Increased Climate Action:** ☛ **Addressing climate change** requires a substantial increase in climate finance. ☛ The report emphasizes the need to prevent global temperature rise **beyond 1.5 degrees Celsius by the century's end.**
22 nations pledge to triple nuclear installed capacity by 2050, India not a part of pact	**WHY IN NEWS?** ❖ **Over 20 countries**, led by **the United States, pledge to triple global nuclear installed** capacity by **2050 at COP28.** ❖ The commitment **aims to achieve a "global aspirational goal"** to keep global warming **below 1.5 degrees Celsius** and achieve **net-zero transitions.** **INDIA'S POSITION AND NUCLEAR EXPANSION** ❖ **India refrains from joining the nuclear energy commitment**, aligning with its stance of **not participating in alliances outside the COP process**.

- Former chairman of India's Atomic Energy Commission, Anil Kakodkar, suggests **India must rapidly expand its nuclear sector** to meet **net-zero goals by 2070,** emphasizing the **significance of nuclear energy alongside renewables**.

CURRENT GOALS AND ACHIEVEMENTS:

- **Rapid Expansion for Net-Zero Goal:**
  - India's plan for a **substantial expansion of its nuclear energy** sector to **achieve the net-zero goal by 2070.**
- **Tripling Capacity by 2032**:
  - India aims **to triple its nuclear capacity from nearly 7 GW to about 22 GW by 2032**, reflecting a significant commitment to scaling up nuclear energy.
- **Doubled Capacity through New Reactors**:
  - With the construction of eight new reactors, India is set to double its installed nuclear capacity, adding approximately 6,800 MW in the near future.
- **Energy Demand Beyond Renewables**:
  - Renewables alone can **meet energy demands,** stressing the need for **substantial nuclear energy contributions** as India's hunger for clean energy increases.

IISER Bhopal researches conduct first genome sequencing of Jamun

WHY IN NEWS?

- ***Genome Sequencing Breakthrough:***
  - Led by **Dr. Vineet K Sharma at IISER Bhopal**, the research team uses **advanced sequencing technologies** to decode the **jamun genome**, **uncovering new functional** and evolutionary insights.

ABOUT THE RESEARCH

- **Jamun's Medicinal Properties:**
  - Notable for its **medicinal properties, jamun (Syzygium cumini)** gains attention as researchers complete the **first-ever genome sequencing** of this tree, **aiming to understand the genetic basis** behind its **pharmacological benefits**.
- **Anti-Diabetic and Medicinal Attributes:**
  - Jamun's genome reveals **key genes involved in the adaptive evolution**, emphasizing its **anti-diabetic, antioxidant**, and **anti-inflammatory** properties.

- **Presence of terpenoids and glucosides** explains its pharmacological significance in modern medicine.

❖ **Genetic Adaptations**:

- The study identifies **duplicated genes in the jamun genome**, pointing to **neopolyploidy events** that potentially enhance the **tree's stress tolerance**, making it **resilient against factors like insects, heat, salinity, and drought.**