



## National Strategy for Additive Manufacturing Policy

**For Prelims:** 3D Printing and its Usage

**For Mains:** National Strategy for Additive Manufacturing Policy, 3D Printing, 'Make in India', 'Atmanirbhar Bharat Abhiyan'.

### Why in News?

Recently, the **Ministry of Electronics and Information Technology (MeitY)** unveiled the **National Strategy for [Additive Manufacturing Policy](#)**.

### What are the Highlights of Policy?

- The policy aims to **increase India's share in global additive manufacturing to 5%** within the next three years and **add USD 1 billion to the gross domestic product**.
- Further, it aims to develop **50 India specific technologies for material, machine and software, 100 new startups for additive manufacturing, 500 new products** and train at least **1 lakh new skilled workers**.
- The Policy postulate the tenets of '[Make in India](#)' and '[Atmanirbhar Bharat Abhiyan](#)' that **advocate self-reliance** through the technological transformation of the production paradigm.

### What is 3D Printing?

- **About:** 3D printing is **also known as additive manufacturing** which uses materials such as **plastics and metals** to convert products envisaged on **computer-aided design to real three-dimensional items**.
  - 3D printing is the **opposite of subtractive manufacturing** which is cutting out/hollowing out a piece of metal or plastic with, for instance, a milling machine.
- **Intersection of Technologies:** Additive Manufacturing is the **next generation of digital manufacturing** that allows the **intersection of computing electronics, imaging and the emerging areas of [Artificial Intelligence](#), pattern recognition** and will create intellectual property and export opportunities.
- **Possible Impact:** Additive Manufacturing (AM) has immense potential to **revolutionize India's manufacturing and industrial production** landscape through **digital processes, communication, imaging, architecture and engineering**.
  - The **next wave of startups** will emerge in this area.
- **Usage:** 3D printing traditionally has been used for **prototyping**. 3D printing has a lot of scope in making artificial limbs, stents, dental crowns, parts of automobiles and consumer goods, among others.

### What are Opportunities for India?

- **Eliminating Large Capital Investments:** Machines are cheaper, inventories can be small and space requirements are not large.

- Thus, jump-starting manufacturing does not face the massive hurdle of large capital requirement and the traditional small and medium enterprises can easily be adapted and retooled towards high technology manufacturing.
- **Leveraging India's IT Power:** The Indian software industry is well-established, and plans to increase connectivity are well underway as part of '[Digital India](#)'.
  - This would allow for the creation of additive manufacturing facilities in small towns and foster industrial development outside of major cities.
- **Uniform Quality Standards:** Maintaining uniform product quality is far easier because the entire system is built at the same time and assembly is not required.

## What are the Associated Challenges?

- **Lack of Standards:** Since 3D printing is a **very niche and new domain**, there are **no global qualifications and certification norms**.
- **Hesitation in Adoption:** Another challenge is **to convince the industry and ministries to push for its adoption** in their respective sectors as any new technology, which is not understood easily, faces a tough time.
- **Risk of Job Losses:** In the initial meetings on the subject, there was a **lot of resistance on whether this technology would eat into the jobs of highly-skilled workers** in the medical equipment or aerospace technology sectors.
- **High Costing:** Although actual printing is cheap, **parts to build a 3D printer are very expensive** as the **equipment and manufacturing costs are very high**. In addition, there is a **concern about warranty** hence, resource companies are **hesitant to put 3D-printed parts into their machines if they are not covered for damage** in case the parts fail.
- **Sector Specific Challenges:** Globally and even in India, the **largest consumer of 3D printing is the automotive industry** and right now it is going through a lot of changes like the introduction of [BS-VI](#) and [electric vehicles](#). **New vehicle design development has slowed** and so has the demand for 3D printing.

## Way Forward

- **Promotion of R&D:** There is a need to **accelerate research at our premier engineering schools** on manufacturing machines and methods and encourage the formation of product design centers so that the products are built to **suit the Indian environment and consumers**.
- **Need for Government Support:** There is a need for government support to provide incentives for distributed manufacturing in smaller towns, and for the IT industry to work on creating platforms and marketplaces that connect consumer demands, product designers and manufacturers in a seamless way.

[Source: IE](#)

## Share of Children in Budget 2022-23

**For Prelims:** Poshan 2.0, PM eVIDYA, 'One class, one TV channel' programme, Integrated Child Development Schemes, Findings of NFHS 5 survey.

**For Mains:** State of Children in India and need to address the issues related to them, Steps taken by governments in this direction.

## Why in News?

According to an analysis by a NGO, Children in the country **received the lowest share of allocation in the Budget in 11 years.**

- Budgeting for children by the Union Government had **started as early as 2008** with the publication of the first-ever **Child Budget Statement**. Subsequently, several states have also initiated the practice.

## What is in the Budget for the Children?

- **About:**
  - The total allocation for children in Union Budget 2023 is Rs. 92,736.5 crore, against an allocation of Rs. 85,712.56 crore in the last Budget.
    - Though this is an increase of 8.19% in absolute terms, it's not proportionate to the increase in the total expenditure in the Union Budget.
    - The share of the Budget for children is a **meagre 2.35% of the Union Budget** for the next fiscal (2022-23), which is a reduction of 0.11%, which is the lowest share children have received in the last 11 years.
- **Sector-wise Analysis:**
  - **For Child health:**
    - The **allocation** for child health **has decreased by 6.08%**.
    - One of the most important child health schemes, the **NRHM-RCH Flexi Pool**, has observed a reduced allocation of 8.22%.
      - This flexipool addresses the needs of health systems strengthening and Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) of the States.
  - **For Child Development Programme:**
    - They have seen a **drop of 10.97% in allocation** for the next fiscal at R.17,826.03 crore. These include supplementary nutrition and anganwadi (day care) services.
      - Schemes for children such as **Poshan 2.0**, which provide integrated benefits to women and children, **did not get any additional funds this year.**
      - In 2022-23, an estimated budget of Rs 10,234 crore has been sanctioned to the **Pradhan Matri Poshan Shakti Nirman (PM POSHAN) programme**. Last year, the revised estimate was Rs 10,234 crore.
        - This scheme was **earlier known as the 'National Program of Midday Meal in Schools'** and provided hot cooked meals to school children between the ages of 6 and 14 years.
  - **For Child Education:**
    - The share of child education has witnessed **only a marginal increase of 0.3% points from 1.74%** in the current fiscal to 1.73% for the next fiscal.
    - A **'One class, one TV channel' programme** announced in the budget is a difficult mode of learning for children.
      - The **'One class, one TV channel' programme** of **PM eVIDYA** will be expanded from 12 to 200 TV channels.
  - **For Protection and Welfare of Children:**
    - Schemes for the protection and welfare of children clubbed under the **Mission Vatsalaya** of the Ministry of Women and Children received Rs. 1,472.17 crore.
      - This is 65% more than this fiscal, but below the allocation of Rs. 15,000 crore in 2019-2020, before the scheme was restructured.

## What are the issues with the Budgeting for Children?

- **Mere Annual Accounting Exercise:**
  - Budgeting for children by the Union Government has **remained limited to being a mere annual accounting exercise** culminating in the publication of the **Child Budget Statement (CBS)** by simply collating relevant budget heads across departments.

- This alone does little to address the core objective of remaining responsive to the special needs of children.
- **Lack of Responsibility from State Governments:**
  - State Governments, being **mainly responsible for implementing many of the critical schemes for children**, play an important role in taking this exercise forward.
    - But even for them, it has **mostly been perceived as an accounting responsibility** rather than as a tool to plan and execute interventions for children more effectively.
- **Lack of Standardisation:**
  - Moreover, there is a **lack of standardisation of norms** among government entities for reporting in their respective **Child Budget Statement (CBS)**.

## What about the State of Children in India?

- **NHFS-5 Findings:** The recent [NFHS 5 survey](#) has revealed a mixed picture on child health and nutrition.
  - On one hand there are definite positives like **reduction in child mortality rates**, improvements in the levels of nutrition indicators like stunting and wasting etc.
  - On the other hand, incidents of [anemia](#) among children have gone up **from 58.6% in NFHS 4 to an alarming level of 67.1%** in this round, leading experts to point out that more efforts are needed for meeting the [2030 SDG targets](#).
- **ASER Surveys Findings:**
  - The consecutive [ASER surveys](#) have pointed out that **there has been no improvement in the proportion of children** currently not enrolled in school between 2020 and 2021 and there **exists a lot of variability among the states in this regard**.
- **Impact of Covid-19:**
  - [Covid-19](#) has impacted children in diverse ways - be it physical, emotional, cognitive, or social repercussions, including transition or migration, familial crises, isolation from friends, discontinuity of learning, environment, quarantine, hospitalisation of self or family members, and **entry into adult roles of work or marriage**.
  - Consequently, the **lives of India's children were severely restricted** in terms of their access to education, nutrition and development, and child protection.

## Way Forward

- **Orientation of the government officials** working on child-related interventions **through capacity building programmes is important**, not only for reporting in the CBS but also for enabling them to redesign schemes better and monitor the progress on a regular basis.
- An **outcome orientation of the budget for children is essential** for translating the outlays into better outcomes.
- There is an **urgent need to standardise the reporting structure in the CBS** and the Union Government can develop a detailed framework for it in consultation with states and domain experts to make CBS an effective instrument of accountability as well.
- **Regular monitoring and audits of relevant child related schemes** must be taken up by the respective ministries.

[Source: TH](#)

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## Carbon Capture and Utilisation Technologies

**For Prelims:** CCUS Technologies, Paris Agreement.

**For Mains:** CCUSTechnologies, Applications, Net Zero emissions by 2050, Environment Degradation, Conservation.

## Why in News?

According to a study conducted by **Radboud University**, most **Carbon Capture and Utilisation and Storage (CCUS) technologies**, which **suck carbon dioxide (CO<sub>2</sub>) from the atmosphere and convert it into fuel or other valuable products**, might fail to help the world reach **Net Zero emissions by 2050**.

- The study noted that a majority of these systems are **energy intensive and the resultant product can also release CO<sub>2</sub> into the atmosphere**.
- 'Net zero emissions' refers to achieving an overall balance between greenhouse gas emissions produced and greenhouse gas emissions taken out of the atmosphere.

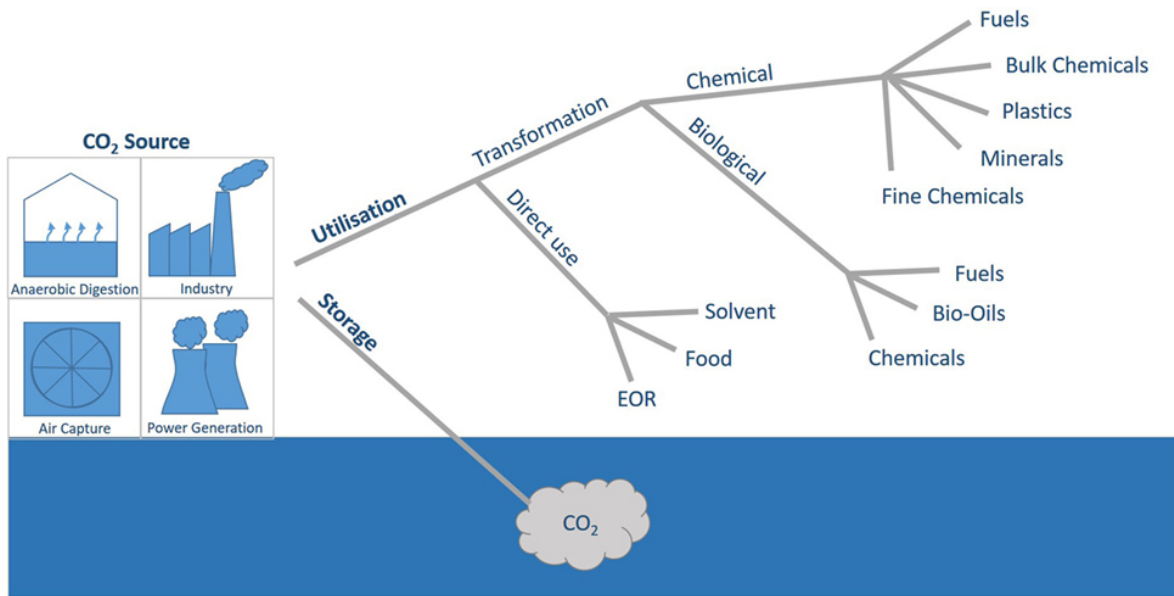
## What are CCUS?

- **Carbon Capture, Utilization, and Storage (CCUS)** encompasses **methods and technologies to remove CO<sub>2</sub> from the flue gas and from the atmosphere**, followed by **recycling the CO<sub>2</sub> for utilization and determining safe and permanent storage options**.
- CO<sub>2</sub> captured using CCUS technologies is **converted into fuel** (methane and methanol), refrigerants and building materials.
  - The captured gas **is used directly** in fire extinguishers, pharma, food and beverage industries as well as the agricultural sector.
- CCUS technologies can play an important role in **meeting net zero targets**, including as one of few solutions to tackle emissions from heavy industry and to remove carbon from the atmosphere.
- CCUS is considered an important tool to help countries halve their emissions by 2030 and reach net-zero by 2050.
  - These goals are crucial to meet the **Paris Agreement targets** for restricting global warming to **2 degrees Celsius (°C)**, and preferable to **1.5°C, over pre-industrial levels**.

## What are Applications of CCUS?

- **Mitigating Climate Change:** Despite the adoption of alternative energy sources and energy efficient systems to reduce the rate of CO<sub>2</sub> emissions, the cumulative amount of CO<sub>2</sub> in the atmosphere needs to be reduced to limit the detrimental impacts of climate change.
- **Agriculture:** Capturing CO<sub>2</sub> from biogenic sources such as plants and soil to boost crop growth in a greenhouse could work.
- **Industrial Use:** Combining CO<sub>2</sub> with steel slag - an industrial byproduct of the steel manufacturing process — to make construction materials compatible with the Paris Agreement goals.
- **Enhanced Oil Recovery:** CCU is already making inroads into India. For instance, Oil and Natural Gas Corporation signed a MoU with Indian Oil Corporation Limited (IOCL) for Enhanced Oil Recovery (EOR) by injecting CO<sub>2</sub>.

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## What are the Challenges associated with CCUS?

- **Expensive:** Carbon capture involves the development of sorbents that can effectively bind to the CO<sub>2</sub> present in flue gas or the atmosphere, which is expensive.
- **Lesser Demand for Recycled CO<sub>2</sub>:** Converting CO<sub>2</sub> into useful chemicals of commercial importance, or utilizing CO<sub>2</sub> for oil extraction or remediation of alkaline industrial wastes, would add economic value to this greenhouse gas.
  - However, the demand for CO<sub>2</sub> is limited compared to the vast amount of CO<sub>2</sub> that needs to be removed from the atmosphere, to reduce the detrimental environmental impacts of climate change.

## Way Forward

- Any viable system for storing carbon must be effective and cost competitive, stable as long-term storage, and environmentally benign.
- Countries should narrow down on the handful of technologies that show more promise and channel investment in them.
- Replacing a conventional fuel with a synthetic fuel like methanol produced via CCU is likely to be a successful mitigation strategy only if clean energy is used to capture CO<sub>2</sub> and convert it into synthetic fuel.

**Source:** DTE

## Sustainable Cities India Program

**For Prelims:** Sustainable Cities India program, National Institute of Urban Affairs (NIUA), World Economic Forum, Smart Cities Mission, Atal Mission for Urban Rejuvenation and Urban Transformation (AMRUT).

**For Mains:** Urbanization, Conservation, Government Policies and Interventions.

Why in News?

Recently, the [World Economic Forum](#) and the **National Institute of Urban Affairs (NIUA)** signed a MoU to collaborate on a jointly designed '**Sustainable Cities India program**'.

- The 'Sustainable Cities India' intends to enable cities to decarbonise in a systematic and sustainable way that will reduce emissions and deliver resilient and equitable urban ecosystems.
- This initiative is in synergy with India's commitment to turn [net zero by 2070 as a climate mitigation response at COP26](#).

### What are the Key Points of 'Sustainable Cities India Program'?

- The program aims to create an **enabling environment for cities to generate decarbonization solutions** across the energy, transport, and the built environment sectors.
- The Forum and NIUA will adapt the **Forum's City Sprint process and Toolbox of Solutions** for decarbonization in the context of five to seven Indian cities across two years.
  - **City Sprint Process:** The City Sprint process is a series of multi-sectoral, multi-stakeholder workshops involving business, government, and civil society leaders to enable **decarbonization, especially through clean electrification and circularity**.
  - **Toolbox of Solutions:** It provides a digital platform containing over 200 examples of clean electrification, efficiency and smart infrastructure best practices and case studies across buildings, energy systems and mobility from over 110 cities around the world.

### What is the Need for Decarbonisation?

- As per the [World Economic Forum's Global Risks Report 2022](#), densely populated countries that are highly dependent on agriculture, such as India, are especially vulnerable to climate insecurity.
  - Decarbonization in cities is a real opportunity to keep global warming well **below 2°C** and cities in India can make an enormous contribution in reaching this goal.
- The **World Economic Forum's Net Zero Carbon Cities' mission** is to create an enabling environment for clean electrification and circularity, resulting in urban decarbonization and resilience.
  - The program aims to do this by fostering public-private collaboration to bridge the gap across the energy, built environment and transport sectors.

### What is NIUA?

- Established in 1976, the **National Institute of Urban Affairs (NIUA)** is India's leading **national think tank** on **urban planning and development**.
- As a hub for the generation and dissemination of cutting-edge research in the urban sector, NIUA seeks to provide innovative solutions to address the **challenges of a fast urbanizing India**, and pave the way for more inclusive and sustainable cities of the future.

### What Initiatives are Taken by Government of India's for Urban Development?

- [Smart Cities Mission](#).
- [Atal Mission for Urban Rejuvenation and Urban Transformation \(AMRUT\)](#).
- [Pradhan Mantri Awas Yojana-Urban \(PMAY-U\)](#).
- [Integrated Command and Control Centres \(ICCCs\)](#).
- [Climate Smart Cities Assessment Framework 2.0](#).
- [TULIP-The Urban Learning Internship Program](#).

[Source: PIB](#)



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## Lachit Borphukan

**For Prelims:** Lachit Borphukan, Ahom Kingdom.

**For Mains:** Ahom Kingdom, Medieval Indian History.

### Why in News?

Indian President will inaugurate a year-long celebration of the **400<sup>th</sup> birth anniversary of Lachit Borphukan**.

- Earlier, the Prime Minister **called 17<sup>th</sup> century [Ahom](#) general Lachit Borphukan a symbol of India's "Atmanirbhar military might"**.

### Who was Lachit Borphukan?

- Born on 24<sup>th</sup> November, 1622, Borphukan **was known for his leadership in the Battle of Saraighat, 1671** in which an attempt by Mughal forces to capture Assam was thwarted.
- He was the **inspiration behind strengthening India's naval force and revitalising inland water transport** and creating infrastructure associated with it due to his great naval strategies.
- The **Lachit Borphukan gold medal** is awarded to the best cadet from the National Defence Academy.
  - The medal was instituted in 1999 to inspire defence personnel to emulate Borphukan's heroism and sacrifices.
- He **died on 25<sup>th</sup> April, 1672**.

### What was the Battle of Saraighat?

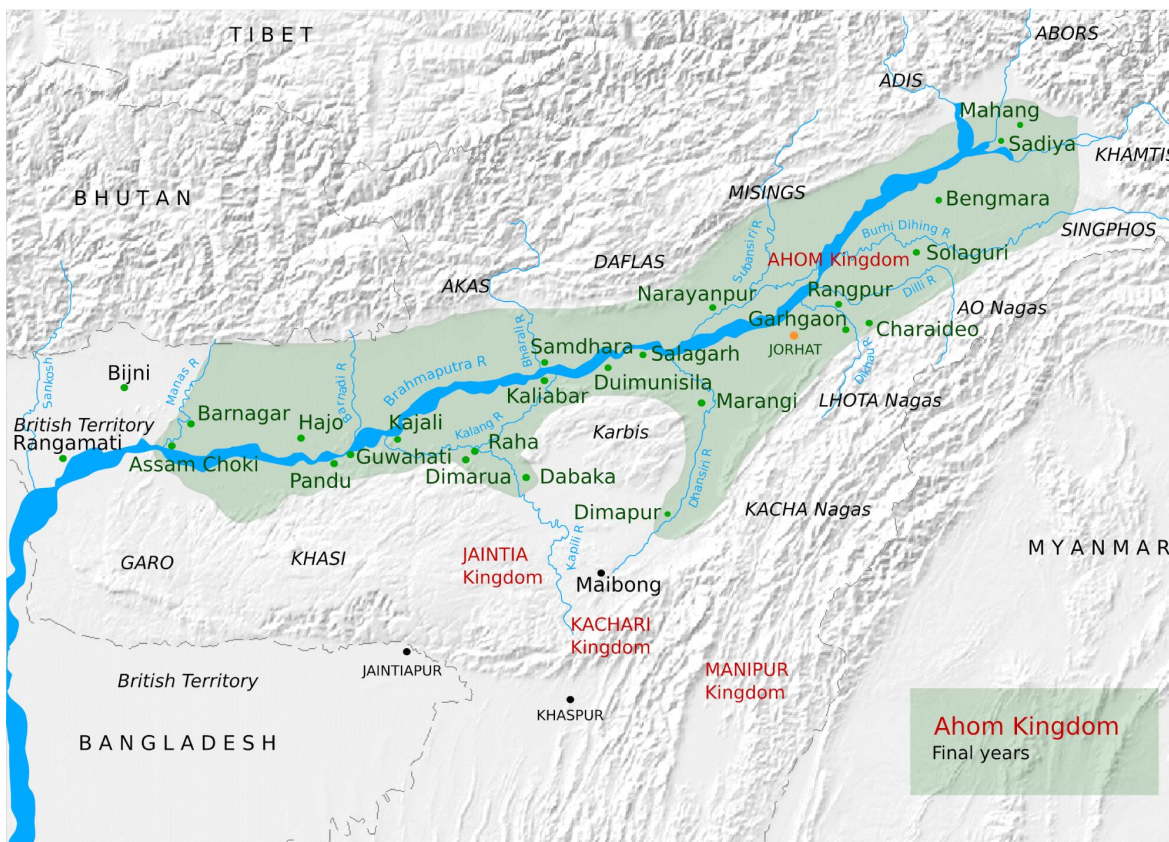
- The battle of Saraighat was **fought on the banks of the Brahmaputra in Guwahati in 1671**.
- It is considered as one of the greatest naval battles on a river which resulted in the victory of Ahoms over the Mughals.

### What was Ahom Kingdom?

- **Founder:**
  - **Chaolung Sukapha was a 13<sup>th</sup> century ruler who founded the Ahom kingdom** that ruled Assam for six centuries. The Ahoms ruled the land **till the province was annexed to British India in 1826 with the signing of the Treaty of Yandaboo**.
- **Political Setup:**
  - Ahoms created a new state by suppressing the older political system of the **bhuiyans (landlords)**.
  - The Ahom state depended upon forced labour. Those forced to work for the state were called **paiks**.
- **Society:**
  - Ahom society was **divided into clans or khels**. A khel often controlled several villages.
  - Ahoms worshipped their own tribal gods, yet they accepted the Hindu religion and the Assamese language.



- However, the Ahom kings did not completely give up their traditional beliefs after adopting Hinduism.
- Intermarriage with local also **increased assimilation processes of Ahoms** in Assamese culture.
- **Art and Culture:**
  - Poets and scholars were given land grants and theatre was encouraged.
  - Important works of Sanskrit were translated into the local language.
  - **Historical works, known as buranjis**, were also written, first in the Ahom language and then in Assamese.
- **Military Strategy:**
  - The **Ahom king was the supreme commander of the state as well as the Military.** The Ahom king himself led the state forces in the time of wars. The Paiks were the main army of the state.
    - There were **two types of Paiks** i.e. serving and nonserving. The non-serving Paiks constituted a standing militia which could be mobilized at a short notice by the kheldar (an expert military organizer).
  - The **full contingent of the Ahom Army** consisted of infantry, navy, artillery, elephantry, cavalry and spies. The main war weapons consisted of bows and arrows, swords, javelins, discus, guns, match-locks and cannons.
  - The Ahoms **sent spies to the enemy's camp** to study the strength and the war strategies of the enemies before leading an expedition.
  - The Ahom soldiers were **experts in guerilla fighting**. Sometimes they allowed the enemies to enter the country, then cut off their communications and attack them in front and rear.
  - **Few important forts:** Chamdhara, Saraighat, Simlagarh, Kaliabar, Kajali and Pandu.
  - They **also learnt the technique of constructing boatbridges in the Brahmaputra.**
  - Above all, the mutual understanding among the civil and military wings, unity among the nobles always worked as strong weapons of the Ahoms.



[Source: Tol](#)

## P-8I Patrol Aircraft

**For Prelims:** P-8I Patrol Aircraft, COMCASA Agreement.

**For Mains:** India-US Defense Ties.

### Why in News?

Aircraft manufacturer Boeing has delivered the 12<sup>th</sup> [P-8I long-range maritime patrol aircraft](#) to the Indian Navy. This completes the follow-on clause for four additional P-8I aircraft contracted in 2016.

### What are the Key Details of P-8I Aircraft?

- It is a **long-range Maritime Reconnaissance and Anti-Submarine Warfare Aircraft**.
- It is **an Indian variant of the P-8A Poseidon aircraft** that Boeing company developed as a replacement for the US Navy's ageing P-3 fleet.
- With a maximum speed of 907 kmph and an operating range of over 1,200 nautical miles, the P-8Is detect threats and neutralize them if required, far before they come anywhere near Indian shores.
- The **Indian Navy became the first international customer** for the P-8 aircraft in 2009.
  - The Navy had procured eight P-8Is under a USD 2.2 billion deal in 2009. The aircraft are **part of the 312A Naval Air Squadron based at Arakkonam in Tamil Nadu**.
  - In 2016, the Navy exercised the optional clause for four more P-8Is in a deal worth over USD 1 billion.
  - Further in May 2021, the US State Department approved the possible sale of six additional P-8I aircraft and related equipment, to India.
  - The six P-8Is will come installed with encrypted communication systems since India has now signed the foundational agreement **Communications Compatibility and Security Agreement (COMCASA) with the US**.

### How are Indo-US Defense Ties?

- This proposed sale (approved in 2021) will help to strengthen the US-Indian strategic relationship.
  - For the US, India continues to be an important force for political stability, peace, and economic progress in the Indo-Pacific and South Asia region.
- Defense purchases from the United States have been increasingly an integral part of growing ties between the two countries.
  - From near zero in 2008, India-US defence trade touched USD 20 billion in 2020, helped along by major policy upgrades.
- The US designated India a Major Defence Partner (in 2016) and then granted it the same access to defence technology as [NATO](#) allies and Australia, Japan and South Korea under Strategic Trade Authorization-1 (STA) in 2018.

### What is the COMCASA Agreement?

- COMCASA (Communications Compatibility and Security Agreement) is **meant to provide a legal framework for the transfer of communication security equipment from the US to India** that would facilitate "interoperability" between their forces — and potentially with other militaries that use US-origin systems for secured data links.
- It is **one of the four foundational agreements** that the US signs with allies and close partners to facilitate interoperability between militaries and sale of high end technology.
- It is **an India-specific version of the Communication and Information on Security Memorandum of Agreement (CISMOA)**.

▪ **Four Foundational Agreements between the US and its Partners:**

- **General Security Of Military Information Agreement (GSOMIA)** - Signed by India in 2002.
  - Allows militaries to share the intelligence gathered by them.
- **Logistics Exchange Memorandum of Agreement (LEMOA)** - Signed by India in 2016.
  - Allows both countries to have access to each other's designated military facilities for refueling and replenishment.
- **Communications and Information Security Memorandum of Agreement (CISMOA)** - Signed by India in 2018.
  - Communications Compatibility and Security Agreement (COMCASA) is the India specific version of CISMOA.
- **Basic Exchange and Cooperation Agreement (BECA)** - India has [signed BECA](#) in 2020.
  - Allows India and US militaries to share geospatial and satellite data with each other.

[Source: TH](#)

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## **Razzaza Lake: Iraq**

### **Why in News?**

Iraq's Razzaza Lake was once a tourist attraction known for its beautiful scenery and an abundance of fish that locals depended on. Now, dead fish litter its shores and the once-fertile lands around it have turned into a barren desert.



## What are the Key Points?

- Razzaza Lake, **also known as Lake Milh, Arabic for Salt Lake**, is **located between Iraq's governorates of Anbar and Karbala**.
- It's the **second largest lake in Iraq** and is part of a wide valley that includes the lakes of Habbaniyah, Tharthar and Bahr al-Najaf.
  - Lake Tharthar is the largest.
- The lake was constructed **as a measure to control floods in the Euphrates and to be used as a huge reservoir for irrigation** purposes.
  - Euphrates River is the **longest river in southwest Asia**. It is one of the two main constituents of the **Tigris-Euphrates river system**. The river **rises in Turkey and flows southeast across Syria and through Iraq**.
- Iraqis and tourists frequented the lake as a recreational spot to cool down during Iraq's hot summers.
- In recent years, it has been affected not only by the water shortage but by drought, neglect and increased evaporation during Iraq's hot summers. It has also been hit by pollution due to the diversion of sewage water into the lake and the theft of water quotas allocated to it.

**Source: IE**

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