

## UPSC Daily Current Affairs | Prelim Bits 30-08-2024

### Rare electron localization in semiconductors

*Researchers have unveiled a rare type of electron localization phenomenon in semiconductors*

- **Semiconductors** - These are materials with electrical properties lying between conductors and insulators.
- **Anderson Localization** - It is an intriguing phenomenon in solid-state physics proposed by American theoretical physicist P W Anderson.
- **Theory** - Localization of elementary quasiparticles like electrons, photons, and phonons in disordered and amorphous semiconductors occurs when doping and impurities lead to the absence of conduction in metals or semiconductors.

*Doping is the process of adding impurities to intrinsic semiconductors to alter their properties. Normally Trivalent and Pentavalent elements are used to dope Silicon and Germanium.*

- **Anderson transition** - As a result of doping and impurities, the electrons that otherwise used to travel from a region of high potential to one of low potential in a conducting material, become confused and roam around the doped or the impurity centers.
- **Quasi classical Anderson transition** - It proposed that potential fluctuations caused by random distributions of charged dopants could also induce a metal-insulator transition.
- **No experimental evidence** - Despite decades of effort, direct experimental verification of this phenomenon has remained elusive.
- **Recent Discovery** - Researchers at Bengaluru's Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) have used oxygen and magnesium as random dopants to demonstrate a quasiclassical Anderson transition phenomena.
- **Percolative metal-insulator transition** - It created a fluctuation electrical potential leading to bubbles of electrons inside the parent material.

- During the transition, the structure remain the same but electronically there is a transition.
- **Benefits** - Such an electronic transition semiconductors could open pathways for their utilization in various applications, including lasers, optical modulators, photoconductors, spintronic devices, and photorefractive dynamic holographic media.
- **Efficient semiconductors** - Potential fluctuations can be a novel tool to alter semiconducting properties in materials to create more efficient semiconductors.

## References

[PIB | Rare electron localization phenomena in Semiconductors](#)

## Dhangars

*A large group of Dhangars recently marched to the office of the subdivisional officer in Khamgaon of Maharashtra's Buldhana district, demanding a "grazing corridor" for their sheep and goats.*

- **Dhangars** - They are ***community of shepherds*** classified as a nomadic tribe (***Vimukta Jati and Nomadic Tribes***) in Maharashtra.
- At the central level classification, they are categorised as Other Backward Classes (***OBC***).
- **Other names** - They are known by other names such as ***Dhangad Golla and Kuruba*** elsewhere.
- **Population** - The second-largest community in the State after the Marathas, constituting ***9% or 1.5 crore of the State's population*** as per the 2011 Census.
- **Spread** - Dhangars live in the central plateau of Maharashtra during the monsoon season.
- Besides Maharashtra, they live in Gujarat, Karnataka, and Andhra Pradesh.
- **Livelihood** - Traditionally they are shepherds, cowherds, buffalo keepers, blanket and wool weavers, butchers and farmers.
- They sow dry crop of 'bajra' in deccan during the monsoon season and let their flock and herds graze here.
- **Migration** - By October they reap the harvest and move to Konkan-a fertile Agricultural region.
- The Konkan peasants welcome them to manure and fertilise their fields for

the 'rabi crop.

- They stay here till the monsoon arrives and then move on to the dry plateau carrying with them the rice given by the Konkans.
- **Grazing Prohibition** - Indian Forest Act, 1927 prohibits cattle grazing, and pronounces a penalty of up to ₹500 in addition to compensation for damage done to the forest.
- **Forest Rights Act** - Scheduled Tribes (ST) and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 permits traditional activities such as grazing.
- Dhangars, who come under the nomadic tribe's category, do not get benefitted under the act.
- **Demand** - They have been demanding Scheduled Tribe (ST) status and "grazing corridors" for the recognition of their right to graze along their traditional routes.

## References

1. [The Hindu | Dhangars in search of legal pastures](#)
2. [Indian Express | Who are the Dhangars of Maharashtra](#)

## INS Arighaat

*The 2<sup>nd</sup> Arihant-Class submarine 'INS Arighaat' was recently commissioned into the Indian Navy at Visakhapatnam.*

- **INS Arighat or S-3-** It is the 2<sup>nd</sup> Ship Submersible Ballistic Nuclear (SSBN) submarine in its class.

*The Arihant class submarines are named after a Sanskrit word meaning the "Destroyer of the Enemy".*

- **Aim** - To ***boost deterrence and establish strategic balance.***
- It is a ***nuclear triad***, the capability to launch nuclear weapons from land, air, and sea.
- **Manufactured by-** Shipbuilding Centre (SBC), Visakhapatnam.
- **Size-** The submarine is approximately 112 meters long, weighs around 6,000 tonnes.
- **Power-** It has a nuclear reactor enabling speeds of ***12-15 knots*** on the surface and 20-24 knots when submerged.

- **Armament-** It can carry 10-12, K-15 nuclear-tipped submarine-launched ballistic missiles (SLBMs) with a range of ***about 750 km***.
- It is equipped with ***4 vertical launch tubes*** for missile launches.
- **Stealth and Deterrence-** Nuclear-powered submarines like INS Arighat are stealthier, can dive deeper, and stay submerged longer, boosting India's deterrence and strengthening its nuclear triad

***INS Aridaman or S4*** nuclear-powered submarine with longer-range ballistic missiles (over 3,000 km), is under construction.

### **Ship Submersible Ballistic Nuclear (SSBN)**

- A Ship Submersible Ballistic Nuclear (SSBN) is a type of nuclear-powered submarine that is designed to carry and launch ballistic missiles.
- SSBNs are primarily used as deterrents and are not usually used for attack submarines. They are considered a dependable platform for a second-strike against a nuclear attack.
- **Ship Submersible-** Refers to the submarine's ability to operate underwater, making it less detectable and more difficult to target compared to surface ships.
- **Ballistic-** Indicates that the submarine carries ballistic missiles, which are long-range missiles that are launched from the submarine and follow a predetermined trajectory to strike targets, typically carrying nuclear warheads.
- **Nuclear-** It has two aspects
  - The submarine is powered by a nuclear reactor, giving it the ability to remain submerged for long periods and travel great distances without needing to surface.
  - The ballistic missiles it carries are usually armed with nuclear warheads.
- SSBNs are a key component of a nation's nuclear triad, which typically includes land-based missiles, air-delivered nuclear weapons, and sea-based nuclear capabilities.

### **References**

1. [The Hindu | INS Arighaat](#)
2. [Deccan Herald | India's second nuclear submarine](#)

### **NITI Aayog's Report on Edible Oils and Atmanirbharta**

Recently, NITI Aayog released a report titled "Pathways and Strategies for Accelerating Growth in Edible Oils Towards the Goal of Atmanirbharta".

- **Outline-** The report outlines strategic interventions aimed at increasing India's domestic edible oil production by a significant **43.5 million tonnes (MT)**.
- This ambitious goal seeks to bridge the import gap and move the country towards self-sufficiency in edible oils.

## Key Highlights

- **Surge in edible oil consumption-** The Per capita consumption of edible oil in India has risen to 19.7 kg/year.
- In 2022-23, India imported 16.5 million tonnes (MT) of edible oils, with domestic production fulfilling only **40-45% of the requirements**.
- **Projected growth and demand-** Under a Business-As-Usual (BAU) scenario, domestic supply is expected to reach 16 MT by 2030 and 26.7 MT by 2047.

*Business-As-Usual (BAU) scenario is a scenario for future patterns of activity assumes that there will be no significant change in people's attitudes and priorities, or no major changes in technology, economics, or policies.*

- Demand forecasts vary based on different approaches, with potential gaps of up to 29.5 MT by 2030 and **40 MT by 2047** under high consumption scenarios.
- **Strategic interventions for self-sufficiency** - The proposed strategy is structured across 3 key pillars
  - **Crop Retention and Diversification** - It involves retention of crops whereas involves adding new crops or cropping systems to a farm.
  - **Horizontal Expansion-** Horizontal expansion in agriculture is the practice of cultivating crops on flat land, typically in large outdoor fields or plots.
  - It increases the cultivation area for oilseeds, utilizing rice fallow lands and wastelands for crops like palm.
  - **Vertical expansion-** Vertical farming is a method of growing crops in layers, rather than on a single surface, to produce more food in less space.
  - It enhances yields through improved farming practices, better-quality seeds, and advanced production technologies.
- **State-wise quadrant approach-** Identifies state clusters for targeted interventions based on cultivation area and yield

- High Area-High Yield (HA-HY)
- High Area-Low Yield (HA-LY)
- Low Area-High Yield (LA-HY)
- Low Area-Low Yield (LA-LY)
- **Potential gains-** Strategic interventions could increase domestic production by 43.5 MT, potentially bridging the import gap and achieving self-sufficiency.
- Specific strategies include utilizing rice fallow areas, improving yield gaps in oilseeds, and expanding palm oil cultivation.
- **Recommendations-** Emphasizes the need for ***robust systems, public-private partnerships***, and a dynamic trade policy to support growth.
- Public awareness and consumption could encourage domestic oilseed consumption and awareness of dietary guidelines.
- The report suggests a focused and rigorous implementation of the recommended strategies to meet future demands and achieve self-sufficiency by 2030 and beyond.

## Reference

[PIB | NITI Aayog's Report on Edible Oils and Atmanirbharta](#)

