

Ammonia from crops

- Based on machine learning, researchers have come up with detailed estimates of ammonia emissions from rice, wheat, and maize crops.
- The dataset enabled a crop land-specific assessment of the potential for emission reductions, which indicates that effective management of fertilizer in the growing of these crops could lower atmospheric ammonia emissions from farming by up to 38%.
- Atmospheric ammonia is a key environmental pollutant that affects ecosystems across the planet, as well as human health.
- Around 51-60% of anthropogenic ammonia emissions can be traced back to crop cultivation, and about half of these emissions are associated with three main staple crops: rice, wheat, and maize.
- However, quantifying any potential reductions in ammonia emissions related to specific croplands at high resolution is challenging and depends on details such as nitrogen inputs and local emission factors.
- The Hindu

AI and language

- A new machine learning model trained on video and audio recorded from the first-person perspective of one young child for over a year has provided insights into early language acquisition.
- Not only do the findings offer a valuable framework to understand how children learn words and concepts, but they could be critical in developing AI systems that can learn language in more human-like ways.
- The model provides a foundation for investigating how children acquire their first words.

The Hindu

Herbivores and ecosystem

- The effect of large herbivores on plant abundance and diversity depends more on their size and diet than whether they are native or introduced into their host ecosystems, as per a meta-analysis of over 200 studies.
- The findings counter the widely held notion that the impacts of introduced megafauna are distinct and more harmful than those of native megafauna and suggest that trait-based ecology provides better insight into mega herbivore plant

interactions than concepts of species origin.

Is there new evidence that Mars once had lakes and rivers?

- Ground penetrating radar on board NASA's Mars Perseverance rover has confirmed that the Jezero Crater, formed by an ancient meteor impact just north of the Martian equator, once harbored a vast lake and river delta.
- Over eons, sediment deposition and erosion within the crater shaped the geologic formations visible on the surface today.
- The discovery of lake sediments reinforces the hope that traces of life might be found in soil and rock samples collected by Perseverance.
- The crater filled with water has layers of sediments deposited on the crater floor.
- The lake subsequently shrank and sediments carried by the river that fed it formed an enormous delta.

The Hindu

Conjugate vaccine

- There are two conjugated typhoid vaccines the Typbar TCV typhoid vaccine manufactured by Bharat Biotech that received WHO prequalification in 2017,

- And Biological E's Vi-CRM197 conjugated typhoid vaccine, which received WHO prequalification in 2020.

What are conjugate vaccine?

- A conjugate vaccine is a type of subunit vaccine which combines a weak antigen with a strong antigen as a carrier so that the immune system has a stronger response to the weak antigen.

Subunit vaccines

- Subunit vaccines are composed of protein or glycoprotein components of a pathogen that are capable of inducing a protective immune response and may be produced by conventional biochemical or recombinant DNA technologies.
- Recombinant subunit vaccines have distinct advantages over live attenuated and inactivated vaccines since they are efficient in inducing humoral- and cell-mediated immunological responses, and the risks associated with handling the pathogen are eliminated.

humoral- and cell-mediated immunity

- Humoral immunity produces antigen-specific antibodies and is primarily driven by B cells.
- Cell-mediated immunity on the other hand does not depend on

antibodies for its adaptive immune functions and is primarily driven by mature T cells, macrophages and the release of cytokines in response to an antigen.

- Salmonella Typhi bacteria that causes typhoid could rebound in children aged 5 -15 years after being vaccinated due to waning protection by a single dose of the vaccine;
- The typhoid rebound in vaccinated children is based on a mathematical model of the transmission dynamics of the bacteria.

The Hindu

Fiscal consolidation

- Fiscal deficit refers to the shortfall in a government's revenue when compared to its expenditure.
- When a government's expenditure exceeds its revenues, the government will have to borrow money or sell assets to fund the deficit.
- Taxes are the most important source of revenue for any government.
- The fiscal deficit should not be confused with the national debt.
- The national debt is the total amount of money that the government of a country owes its lenders at a particular point in time.
- The national debt is usually the amount of debt that a government has accumulated over many years of running fiscal deficits and borrowing to bridge the deficits.
- The fiscal deficit is generally expressed as a percentage of a country's GDP since it is believed that the figure shows how easily the government will be able to pay its lenders.

How does the government fund its fiscal deficit?

- In order to fund its fiscal deficit, the government mainly borrows money from the bond market where lenders compete to lend to the government by purchasing bonds issued by the government.
- It should be remembered that central banks such as the Reserve Bank of India (RBI) are also major players in the credit market, although they may not always directly purchase government bonds.
- The RBI may still purchase government bonds in the secondary market, from private lenders who have already purchased bonds from the government.
- So, when a government borrows from the bond market, it not only borrows from private lenders but

also indirectly from the central bank.

- The RBI purchases these bonds through what are called 'open market operations' by creating fresh money, which in turn can lead to higher money supply and also higher prices in the wider economy over time.

Why does the fiscal deficit matter?

- The fiscal deficit matters for several reasons.
- For one, there is a strong direct relationship between the government's fiscal deficit and inflation in the country.
- When a country's government runs a persistently high fiscal deficit, this can eventually lead to higher inflation as the government will be forced to use fresh money issued by the central bank to fund its fiscal deficit.
- The fiscal deficit also signals to the market the degree of fiscal discipline maintained by the government.
- A lower fiscal deficit may thus help improve the ratings assigned to the Indian government's bonds.
- When the government is able to fund more of its spending through tax revenues and borrow less, this gives more confidence to lenders and

drives down the government's borrowing cost.

- A high fiscal deficit can also adversely affect the ability of the government to manage its overall public debt.

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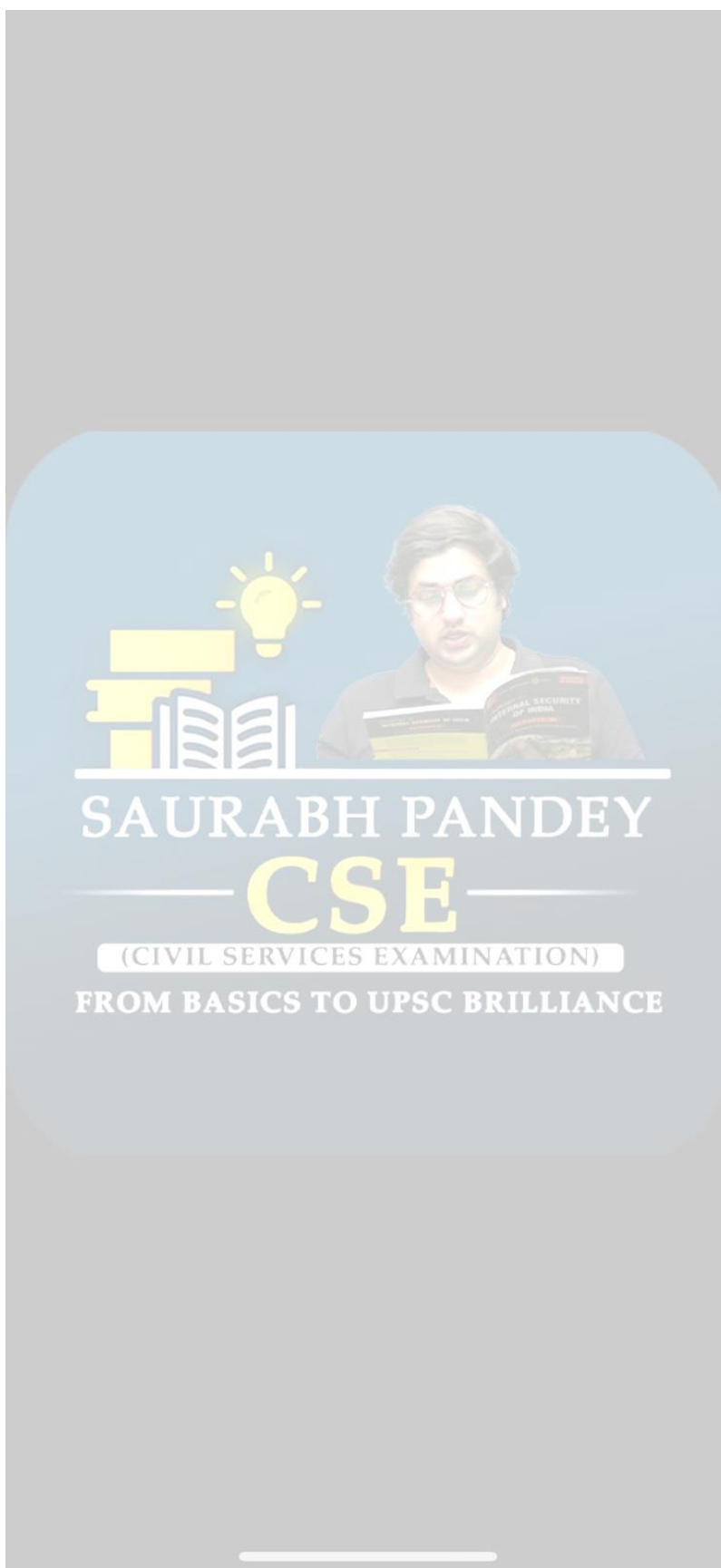
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