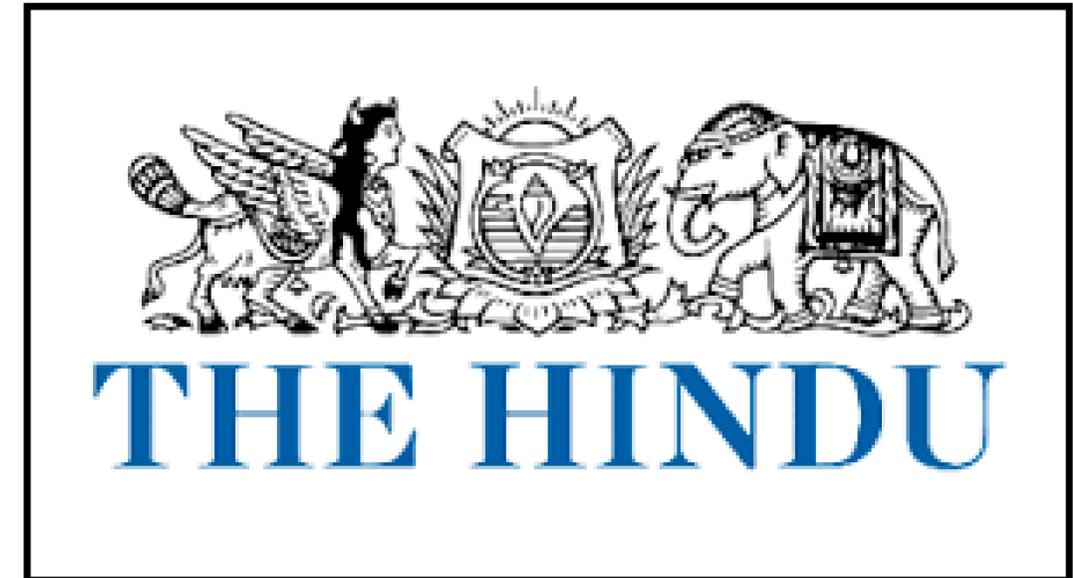




Topics



- Defense against virus
- The \square fizz in the shaving cream
- Report on Income and Wealth Inequality in India
- PMAY
- Glacial lakes expanding
- Mains



By saurabh pandey sir



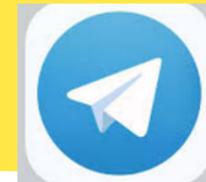
Target Mains 2024/25



Q“ Biosphere will not remain untouched with changes in cryosphere” Elaborate

प्रश्न" क्रायोस्फीयर में परिवर्तन से जीवमंडल अछूता नहीं रहेगा" विस्तार से बताएं

send your answer - Saurabh pandey
upsc telegram channel



Madhuri Gupta

Renewable energy expansion will impact food security and biodiversity. Examine.

Renewable Energy refers to energy derived from natural resources that are restore on human timescale such as wind, solar, rain, tides and geothermal heat.

The expansion of Renewable Energy can have both positive and negative impact on food security and biodiversity.

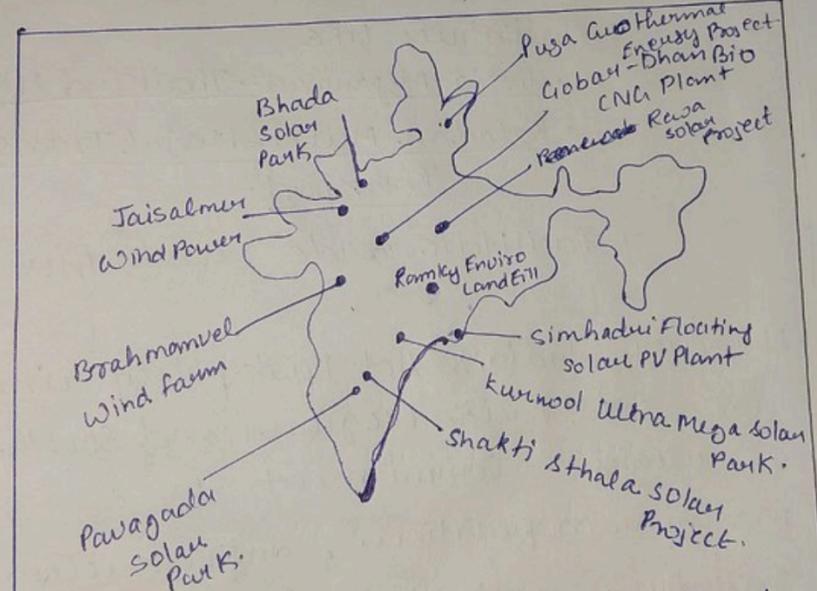


Fig. India's Renewable Energy Project.

In COP28 • India target to achieve 500GW by 2025.
• Green development pact → tripling of RE was possible for 80% and emissions.

Positive impact food security and biodiversity

- Environment Relations
 - Reduce reliance on fossil fuels.
 - Mitigate climate change with help of RE.
 - Renewable Energy like wind and solar produce electricity without emitting GHG.
 - Reduced Environment degradation.
- Social Relations
 - Increase Energy infrastructure.
 - Land use efficiency
 - Eg ⇒ Panel and wind turbines requires less land.
 - Pressure land for agriculture, Natural habitats.
 - Conserve water.
- Economic Relations
 - Increase in investing can create more jobs.
 - So economic opportunities improve.
 - So enhance food security.
 - So developed economic.
 - Jobs in R.E is alternative income for rural.

Negative impact of food security and biodiversity.

- Environment Relations
 - Disrupt ecosystem and threaten Biodiversity
 - due to construction of R.E introduced varieties type of species and plants.

Social Relations

- Land use conflict
- Solar panels and solar park requires large scale land area.
- To reducing food production and harm biodiversity.
- Water scarcity.

Economic Relations

- due to infrastructure wildlife corridor, habitat corridor or green corridor
eff impact Eg → access Roads
- disrupt wildlife populations
- Monoculture farming practices are less supportive for production of food.

Steps taken

- Land Use Planning and Management.
- Strategic Site location/selection.
- Water Resource Management.
- Sustainable Production
- Local Community Engagement

Renewable Energy Balancing due to expansion with land use planning, environmental and economical assessment are vital role to minimize negative impact on food and security and biodiversity.

TOPERS FIRST FULL LENGTH TEST -2 (PRELIMS VIJAY SERIES)



- 1- Ankur
- 2- Puja yadav
- 3- Nikki Aggarwal

Prelims Vijay series TEST-2 (full length) X

Student leaderboard

Student name	Marks	Grade	Rank
Ankur	137.93/200	B	1
Puja Yadav	118.6/200	B	2
Nikki Aggarwal	101.92/200	B	3
MAYANK AWASTHI	101.26/200	B	4th
Renu	93.23/200	C	5th
Asmita	89.94/200	C	6th

New type of host defence against Zika, dengue viruses revealed

In an elegant series of experiments, researchers showed that some extracellular vesicles bear the same proteins on their surface that some viruses use to enter cells, and that they compete with these viruses for the same receptors and crowd them out, preventing an infection

Arun Panchapakesan

The mere presence of a virus in a bodily fluid doesn't mean it is transmitted via that route. Zika, dengue, and chikungunya viruses are present in fluids like saliva and semen but don't spread orally or sexually. This fact has puzzled scientists for years, and now a research team has finally explained why.

On March 29, 2020, the World Health Organisation (WHO) posted a tweet that sparked concerns among scientists and prompted many to contact the WHO to say there was enough evidence to discredit the tweet's contents, and suggest it steer clear of such assertions. The tweet was later proven to be factually incorrect but the WHO remained unconvinced for almost two years.

It read "FACT: #COVID19 is NOT airborne".

Transmission is a crucial event in a virus's life cycle, yet studying it has been very tricky. A virus that can't transmit is of no consequence to anyone. Successful viruses have extraordinary adaptations selected through years of evolution to ensure they can jump to new hosts.

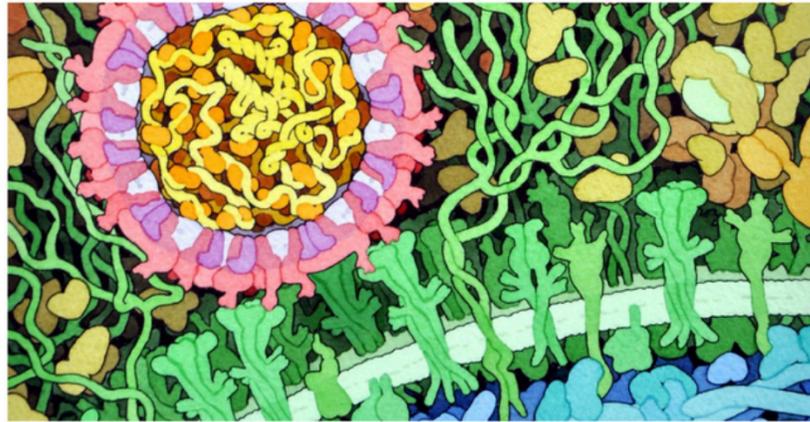
What does a virus do inside the body?

Most human viruses achieve this by ensuring they are present in bodily fluids that contact the outer environment, and subsequently, a new host.

Once inside the new host, a virus must be present at the correct location to infect new target cells. Viruses are usually highly selective in the cells they infect. This phenomenon, called tropism, occurs because most viruses have special proteins on their outer surface that make contact with a receptor on the host cell. Any cell-type that makes the receptor can be infected by the virus.

For example, the receptor for HIV is a protein called CD4. Only cells that make the CD4 protein, such as T-cells and macrophages, can be infected by HIV. Similarly, SARS-CoV-2 uses a receptor called ACE2. Cells of the respiratory tract and some cardiovascular cells all express ACE2, and are target cells for SARS-CoV-2. HIV can't infect respiratory cells, and SARS-CoV-2 can't infect T-cells or macrophages.

Viral transmission is an outcome of a chase inside the host: between the virus making copies of itself and the immune system trying to destroy the virus and infected cells. The virus must transmit before the immune system beats it or the host dies. One strategy viruses use to achieve this is by making proteins on the surface that have receptors on multiple cell-types. Such a strategy will allow them to infect different cell-types, allowing



A space-fill drawing showing a cross-section through a Zika virus particle as it interacts with a cell. The two main proteins of the viral envelope are shown in red and purple. The lipid membrane of the envelope is shown in lavender. The capsid proteins, in orange, are shown interacting with the RNA genome, in yellow, at the virus's centre. The cell-surface receptor proteins are in green, the cytoskeleton in blue, and blood plasma proteins in gold. DAVID GOODELL. (CC BY 4.0)

access to multiple body fluids, enabling faster transmission.

What is the PS receptor?

One such receptor is for a protein called phosphatidyl serine (PS). The PS protein is usually expressed by dying cells in the body, as a signal to the immune cells to destroy them. The immune cells express the PS receptor and fuse themselves with these cells, quietly destroying them. Viruses hijack this pathway with a process called apoptotic mimicry: by expressing the PS protein on their own surfaces, allowing them to infect the very cells that will destroy them.

The WHO's tweet and its subsequent withdrawal exemplifies the difficulties of studying viral transmission. The problem is especially challenging when we're studying viruses that can use the PS receptor for entry. Since the PS receptor is expressed by many cells – apart from some cells of the immune system – the virus tends to be present in multiple compartments. Yet, the mere presence of a virus in a given compartment wouldn't guarantee transmission from that route.

For example, the Zika virus can be detected in semen, saliva, and breast milk but rarely spreads through these means despite the presence of target cells in the oral and genital cavities. Zika transmits mainly via mosquitoes.

How does the body defend itself?

Now, scientists at the Institute of Molecular Virology at the Ulm University



Transmission is a crucial event in a virus's life cycle. A virus that can't transmit is of no consequence to anyone. Successful viruses have extraordinary adaptations selected through years of evolution to ensure they can jump to new hosts

Medical Centre, Germany, have identified a novel defence mechanism the human body uses to prevent Zika and some other viruses from transmitting via non-conventional routes. The study, published in the journal *Nature Microbiology* on March 25, explains how the body uses extracellular vesicles in these bodily fluids to inhibit viral infection.

Vesicles are small structures enclosed by fat that a cell uses to transport substances from one part of the cell to another. When they are secreted outside the cell, they're called extracellular vesicles. The researchers discovered that these extracellular vesicles are abundant in saliva and semen and contain the same PS proteins on their surface that viruses like Zika use for infection. The team also discovered that the concentration of these extracellular vesicles that contain PS is low in the blood and high in saliva and semen.

Through a series of experiments, they demonstrated the PS-containing vesicles compete for the same receptors the viruses use for entry, thus crowding the latter out and preventing an infection.

What does the discovery portend?

The group also showed that all viruses that use the PS receptor for apoptotic mimicry – the dengue, chikungunya, West Nile, ebola, and the vesicular stomatitis viruses – are inhibited by the presence of extracellular vesicles. The vesicles' presence didn't affect the infectivity of viruses that don't use the PS receptor for entry, such as HIV and SARS-CoV-2.

The discovery of PS-coated vesicles for immunity represents a novel type of host defence against viral infection. While it is too early to speculate on potential therapeutic applications from this discovery, it opens up avenues for further research.

One thought-provoking, but also far-fetched, notion arising from the study is the possibility that PS-containing vesicles in humans could have influenced the evolution of mosquito-borne viruses. Perhaps these viruses were forced to look for an alternative when they couldn't spread through saliva or semen, and, to paraphrase Michael Crichton, "life found a way."

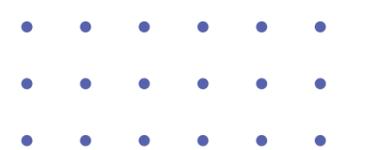
(Arun Panchapakesan is an assistant professor at the Y.R. Gaiithonde Centre for AIDS Research and Education, Chennai.)

THE GIST

A virus must be at the correct location to infect new target cells. Viruses are selective. This is because viruses have special proteins on their outer surface that make contact with a receptor on the host cell. Any cell-type that makes the receptor can be infected

The HIV receptor is CD4. Only cells that make CD4, such as T-cells and macrophages, can be infected by HIV. SARS-CoV-2 uses a receptor called ACE2. Cells of the respiratory tract express ACE2, and are targets. HIV can't infect respiratory cells, and SARS-CoV-2 can't infect T-cells

Viral transmission is an outcome of a chase inside the host: between the virus making copies of itself and the immune system. The virus must transmit before the immune system beats it or host dies



Defense against virus

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- **This is because viruses have special proteins on their outer surface that make contact with a receptor on the host cell. Any cell-type that makes the receptor can be infected ☐**
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QUESTION CORNER

The fizz in the shaving cream

Q

Q. How do they get all that shaving cream into an aerosol can?

A: Shaving cream is basically soap and water. It is put into a can along with compressed butane gas. Without the gas, all you have is soapy liquid.

When the valve is pressed, some of the gas mixes with the soap and water, escapes, and expands to make foam.

The filling process is like the process used to fill air in the tube of a tyre, or even a balloon.

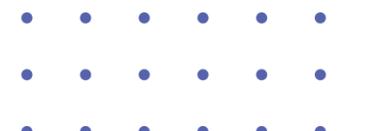
As long as the pressure is maintained in a closed system and the gas from a pressurised source is not allowed to escape, it takes up a very small amount of space.

The fact that any pressurised gas expands when the pressure is released means that a small quantity of soap and water can make a whole lot of foamy bubbles.



Since pressurised gas expands when the pressure is released, it means that a small quantity of soap and water can make a whole lot of foamy bubbles. GETTY IMAGES

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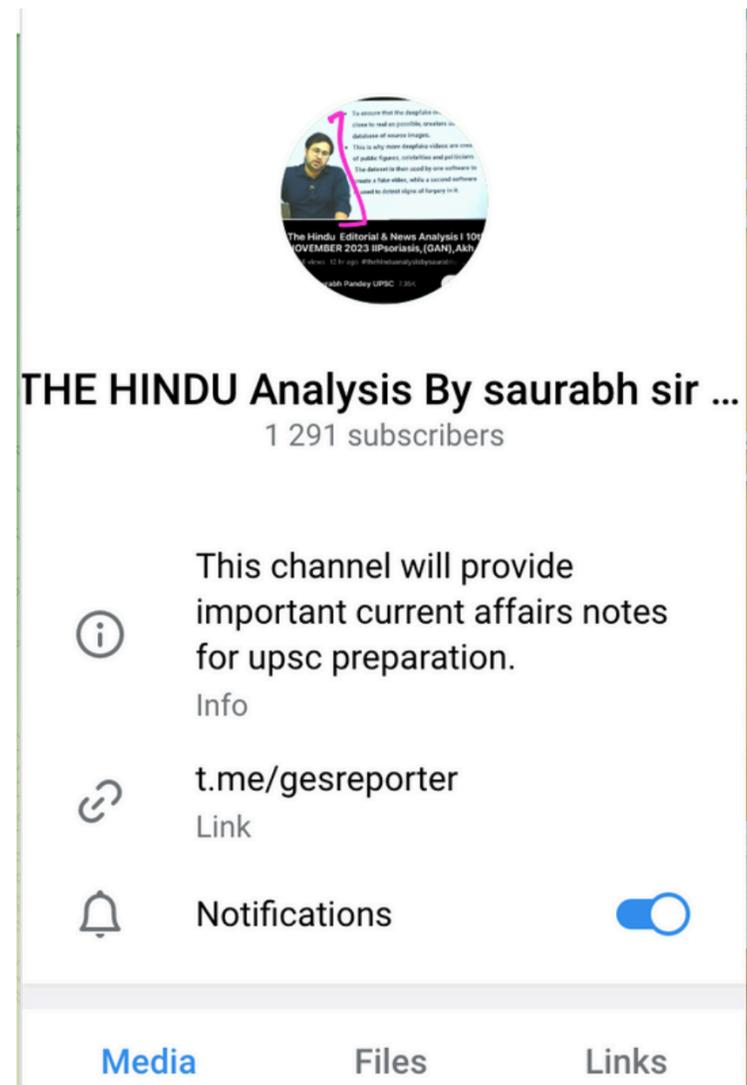


The \boxtimes fizz in the shaving cream

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Towards a less poor and more equal country

In March, World Inequality Lab, a global research centre focused on inequality and public policies, published a working paper titled, "Income and Wealth Inequality in India, 1922-2023: The Rise of the Billionaire Raj". The authors – Nitin Kumar Bharti, Lucas Chancel, Thomas Piketty, and Anmol Somanchi – combined data from national income accounts, wealth aggregates, tax tabulations, rich lists, and surveys on income, consumption, and wealth to present their results.

Income and wealth inequality

First, let's look at income inequality. By 2022-23, the report states, 22.6% of India's national income went to just the top 1% in the country, the highest in the last 100 years. And just the top 0.1% of the population earned nearly 10% of the national income in India. The share of the top 1% in the national income is among the highest in the world.

In terms of wealth inequality, the share of the top 1% in wealth was 40.1% in 2022-23, the highest level since 1961. The share of wealth among the top 10% increased from 45% in 1961 to 65% in 2022-23. Conversely, the share of the bottom 50% and middle 40% in wealth declined. In short, the rich got richer and the poor got poorer in wealth. "About 10,000 individuals out of 92 million Indian adults own an average of ₹22.6 billion in wealth, 16,763 times the average Indian," the report states.

India's wealth inequality is not as extreme as Brazil and South Africa where the top 10% hold 85.6% and 79.7% of the national wealth, respectively. However, its wealth concentration increased threefold between 1961 and 2023. Additionally, as India's income inequality is among the highest in the world, even higher than South Africa, Brazil and the U.S., it will only add to the wealth inequality.

The report says between 2014-15 and 2022-23 "the rise of top-end inequality has been



Santosh Mehrotra

is a Research Fellow at The IZA Institute of Labour Economics, Bonn



Rakesh Ranjan Kumar

is a Senior Research Fellow at the International Institute for Migration and Development, Kerala

The twin objectives of high economic growth and reduction of inequality can only be achieved with improvements in human development and poverty reduction

particularly pronounced in terms of wealth concentration". It states that "the 'Billionaire Raj' headed by India's modern bourgeoisie is now more unequal than the British Raj headed by the colonialist forces." Inequality undermines both growth and reduction of poverty.

Between 1960 and 1980, inequality was dropping. The pattern of growth and its objectives ensured that outcome. However, inequality began increasing with the beginnings of liberalisation in the 1980s, and faster after the 1991 economic reforms in India.

The dynamics of income and wealth inequality are interwoven with the dynamics of economic growth and human development. India's average income adjusted for inflation and purchasing power differentials were on a par with China and Vietnam until 1975. In the next quarter century, incomes in China and Vietnam increased by 35-50% compared to incomes in India. Post-2000, China's income started to grow at an astonishing rate and became 2.5 times India's income. However, growth in China has been broad-based compared to growth in India. In 2022, the share of the top 1% in income in India was nearly 50% higher than that of China. The Chinese economy has been maintaining a higher growth rate over the years with a moderate growth in economic inequality while India's growth has been moderate coupled with extreme growth in economic inequality. That is why India is a "poor and very unequal country".

Here, we would like to emphasise that the twin objectives of high economic growth and reduction of inequality can only be achieved with improvements in human development and poverty reduction. This is what China and Vietnam achieved. Additionally, improvements in human development should precede economic growth if economic growth is to be sustained in the long run. At the national level, the

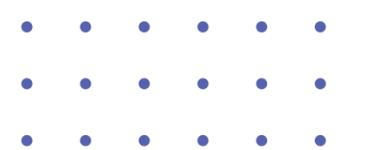
States that sustained high growth over three decades (over 7% GSDP per year) were relatively advanced in human development. These include Kerala, Tamil Nadu, Andhra Pradesh, and Karnataka in the south; Maharashtra and Gujarat in the west; and Punjab and Delhi in the north. States that are relatively backward in the Human Development Index ranking include Jharkhand, Chhattisgarh, Bihar, Madhya Pradesh, Odisha, Uttar Pradesh, and Rajasthan. These States were only able to register a growth rate of less than 5% per annum post-liberalisation.

Human development

The Human Development Report (HDR) 2023-2024 ranked India 134 out of 193 countries. India is now the fifth largest economy but it still ranks lower than Sri Lanka, Bhutan, and Bangladesh in human development. Its economic growth has not translated into growth in human development.

The poor should not have to wait for the benefits of economic growth to trickle down; human development should be given priority in promoting inclusive growth. In the absence of improvement in human development, enhancement of capability and functioning, and poverty reduction, the growth process cannot be inclusive and will only add to inequality. Economic growth therefore does not need to be at a higher pedestal in terms of policy objectives.

As per the HDR 2023-2024, India's score comes down by 31.1% if we account for economic inequality. The extent of economic inequality is such that it cannot be overcome by the Pradhan Mantri Garib Kalyan Anna Yojana, which provides a few kilograms of free foodgrains to about 81.35 crore beneficiaries. Sops without jobs cannot be the basis for sustained and inclusive growth. As the paper says, "It is unclear how long such inequality levels can sustain without major social and political upheaval".





Report on Income and Wealth Inequality in India

- **World Inequality Lab, a global research centre focused on inequality and public policies, published a working paper titled, ‘Income and Wealth Inequality in India, 1922-2023: The Rise of the Billionaire Raj’.**

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An overview of the PMAY-U scheme

What are the objectives of the Pradhan Mantri Awas Yojana scheme? How has the in-situ slum redevelopment vertical under the scheme fared? Has the participation of the private sector in social housing been a success? What is the Centre's contribution to the overall investment expenditure?

EXPLAINER

Tikender Panwar

The story so far:

As the current Union government completes two terms, one of its flagship programmes was Housing For All (HfA) by 2022, both in urban and rural areas, planned under the PMAY (Pradhan Mantri Awas Yojana) scheme in 2015.

What is the PMAY scheme?

While the PMAY is a centrally sponsored scheme both the Union and the State governments are supposed to financially contribute to it. The declared objectives of the scheme included rehabilitation of slum dwellers with private developers' participation; promotion of affordable housing for the weaker sections through Credit Linked Subsidy Schemes (CLSS); affordable housing in partnership with public and private sectors; and subsidy for Beneficiary-led Construction (BLC).

How has the scheme panned out?

Even though two more years have passed since the supposed completion of the scheme, HfA remains a distant reality. In August 2022, the government approved the continuation of the PMAY-Urban (PMAY-U) up to December 31, 2024, for the completion of already sanctioned houses till March 31, 2022.

Currently, according to the government's estimates, there is a shortage of around 20 million houses in rural areas and three million in urban centres. However, these figures do not speak of the actual reality. Till 2023, the urban shortfall was more than 60 lakh houses. According to a study by the ICRIER, urban housing shortage increased by 54%, from 1.88 crore in 2012 to 2.9 crore in 2018. Thus, the PMAY-U has actually faltered. Even according to data from the PMAY dashboard (as of April 15), there is a shortfall of around 40 lakh houses from the sanctioned and



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completed segments. This means that the vertical that is supposed to meet the largest demand, called in-situ slum redevelopment (ISSR), has failed.

According to a PIB press release, under the ISSR, which is the most pressing need in cities, only 2,10,552 houses have been sanctioned for eligible beneficiaries. According to another report by *Newslandry*, the PMAY-U has only addressed a 25.15% of the housing shortage by delivering 80 lakh homes. Even if the remaining houses sanctioned are constructed by the end of 2024, it would have addressed just about 37% of the real need. Almost 2.4 crore households will still be without a roof.

The current housing programme which was a kind of merger of the Rajiv Awas Yojana into the PMAY has spent over \$29 billion in the last five years providing

support for both rural and urban low-cost housing. Despite this focus and budgetary infusion, "Housing for All" remains an unfulfilled promise.

What ailed the PMAY?

The scheme is euphoric in the participation of the private sector in bridging the gap of public investments in social housing. The current estimates suggest that in the Indian urban landscape around 40% (according to the World Bank, 49%) of the people are living in both designated and informal slums. Hence, the success of the PMAY was dependent on addressing the housing question in the slums.

In some of the projects where spaces occupied by the slum dwellers were handed to private players, the vertical growth of such settlements created more

problems for the residents rather than addressing them. Take for example a multi-storey building with the recurring cost of water, electricity and sewerage utilities which at times went beyond the scope of residents' expenditure. Building typologies and linear design with squeezed spaces dissuaded people from occupying such houses. Land was also a major issue. Land registered under airports, railways, forests, etc., was impossible for ISSR. Moreover, plans for ISSR were drawn up by consultants, without any role from the community.

Another major hurdle is the dichotomy existing between the city's master plans and PMAY-U. Most of the cities' plans are now being dictated by big consultants who favour large capital-intensive technological solutions. Take for example, the transit-oriented development models being advocated by the Delhi Development Authority in its 2041 master plan. It does not speak about social housing and states that this must come from market forces. In such a scenario, almost all verticals of PMAY fail.

It is worth noting that the Centre's contribution to the overall investment expenditure under this scheme is just about 25%, or ₹2.03 lakh crore. The bulk of the money is shelled out by the beneficiary households themselves, that is 60% or ₹4.95 lakh crore. State governments (together with Urban Local Bodies) spend ₹1.33 lakh crore on the scheme as well. The architecture of PMAY does not address the landless and the poor. Around 62% of the houses sanctioned come under the BLC vertical where the government's role is limited to just cost sharing with the beneficiaries. CLSS beneficiaries are supposed to be 21%. In both the above, the government has a limited role with just the provision for providing interest subsidy, whereas land is owned by the beneficiaries. Slum-dwelling families that are to be rehabilitated under ISSR make up just about 2.5% of the total beneficiaries.

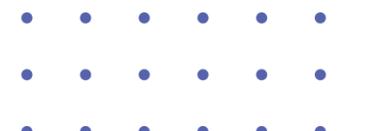
The writer is former deputy Mayor, Shimla, and Member, Kerala Urban Commission.

THE GIST

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PMAY

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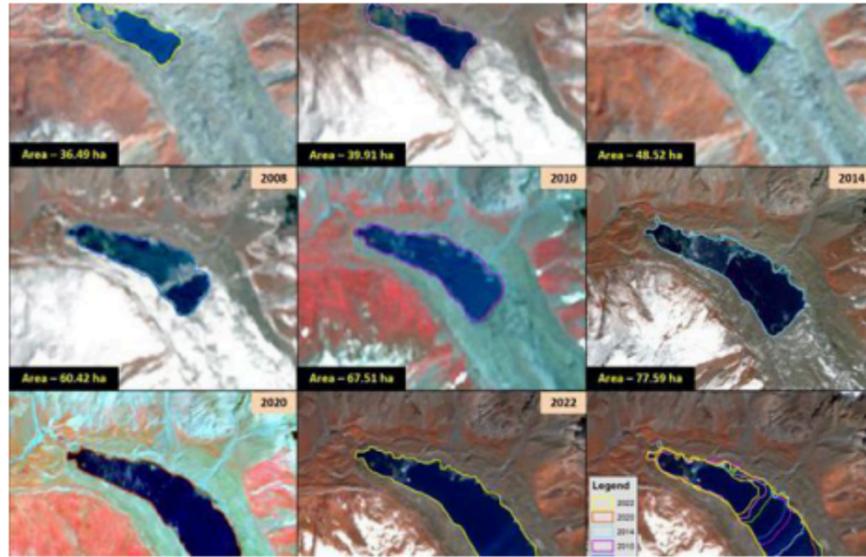


Many glacial lakes expanding, show ISRO images of catchments of Indian Himalayan river basins

Hemanth C.S.
BENGALURU

The Indian Space Research Organisation's (ISRO) long-term satellite imagery covering the catchments of Indian Himalayan river basins from 1984 to 2023 have shown significant changes in glacial lakes.

According to the ISRO, of the 2,431 lakes larger than 10 hectares identified during 2016-17, 676 glacial lakes have notably expanded since 1984. "Specifically, 130 of these lakes are situated within India, with 65, seven, and 58 lakes lo-



The long-term changes in the Ghepang Ghat Glacial Lake area.

cated in the Indus, Ganga, and Brahmaputra River basins, respectively. Of the 676 lakes, 601 lakes (89%)

have expanded more than twice, 10 lakes have grown between 1.5 to 2 times and 65 lakes 1.5 times," the IS-

RO said. It said the elevation-based analysis reveals that 314 lakes are located in the 4,000 to 5,000 m range and 296 lakes are above 5,000 m elevation.

The glacial lakes are categorised based on their formation process into four broad categories, namely Moraine-dammed (water dammed by moraine), Ice-dammed (water dammed by ice), Erosion (water dammed in depressions formed by erosion), and other glacial lakes.

"Among the 676 expanding lakes, the majority of them are Moraine-

dammed [307] followed by Erosion [265], other [96], and Ice-dammed [8] glacial lakes, respectively," the space agency said.

Assessing flood risk

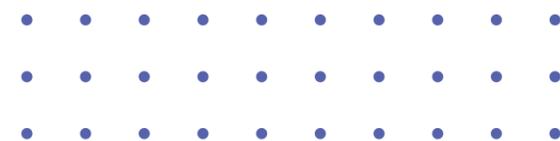
It added that satellite-derived long-term change analyses provide valuable insights for understanding glacial lake dynamics, which are essential for assessing environmental impacts and developing strategies for Glacial Lake Outburst Floods (GLOF) risk management and climate change adaptation in glacial environments.



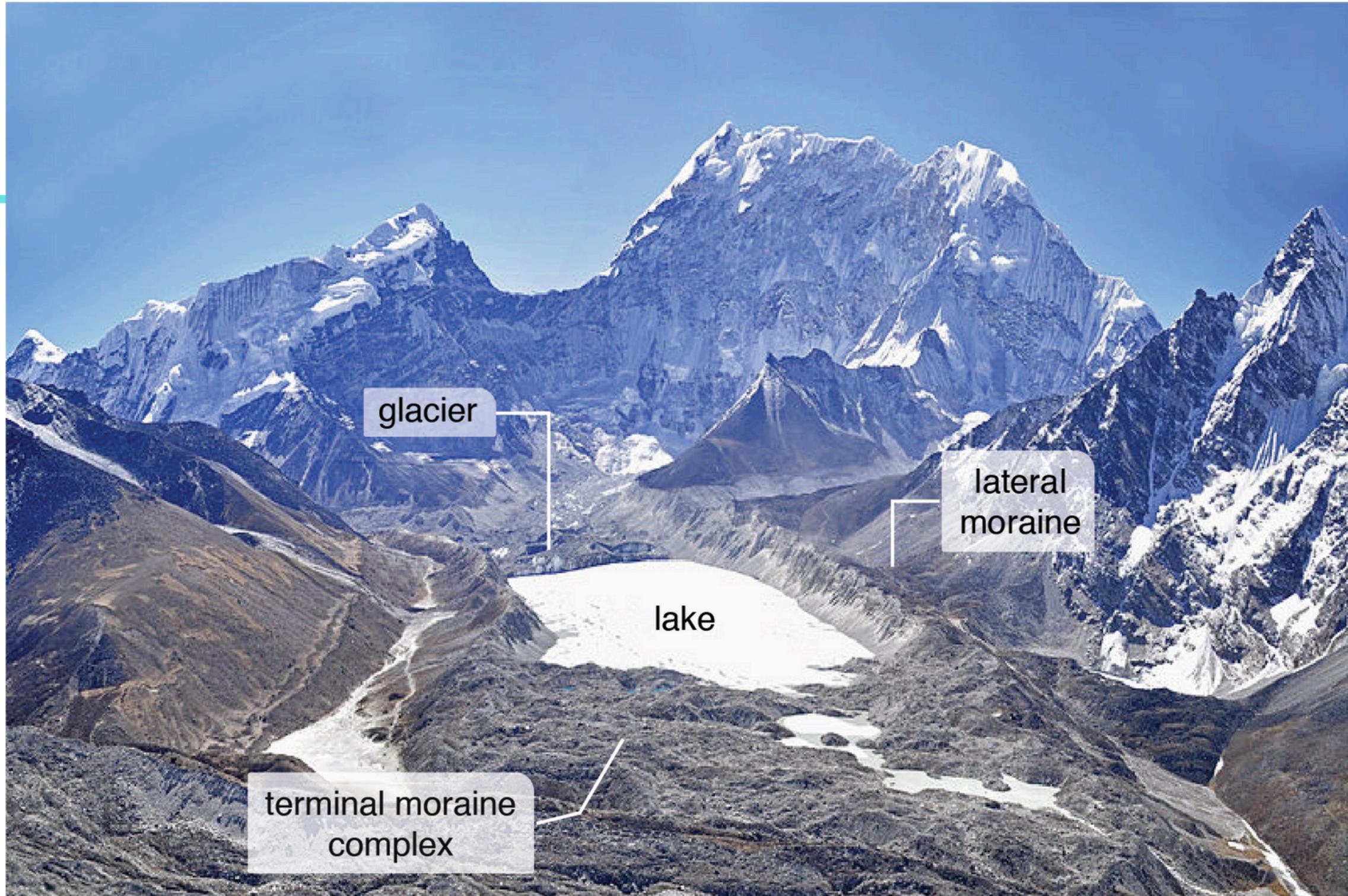
Glacial lakes expanding,



- **The Indian Space Research Organisation's (ISRO) longterm satellite imagery covering the catchments of Indian Himalayan river basins from 1984 to 2023 have shown significant changes in glacial lakes.**
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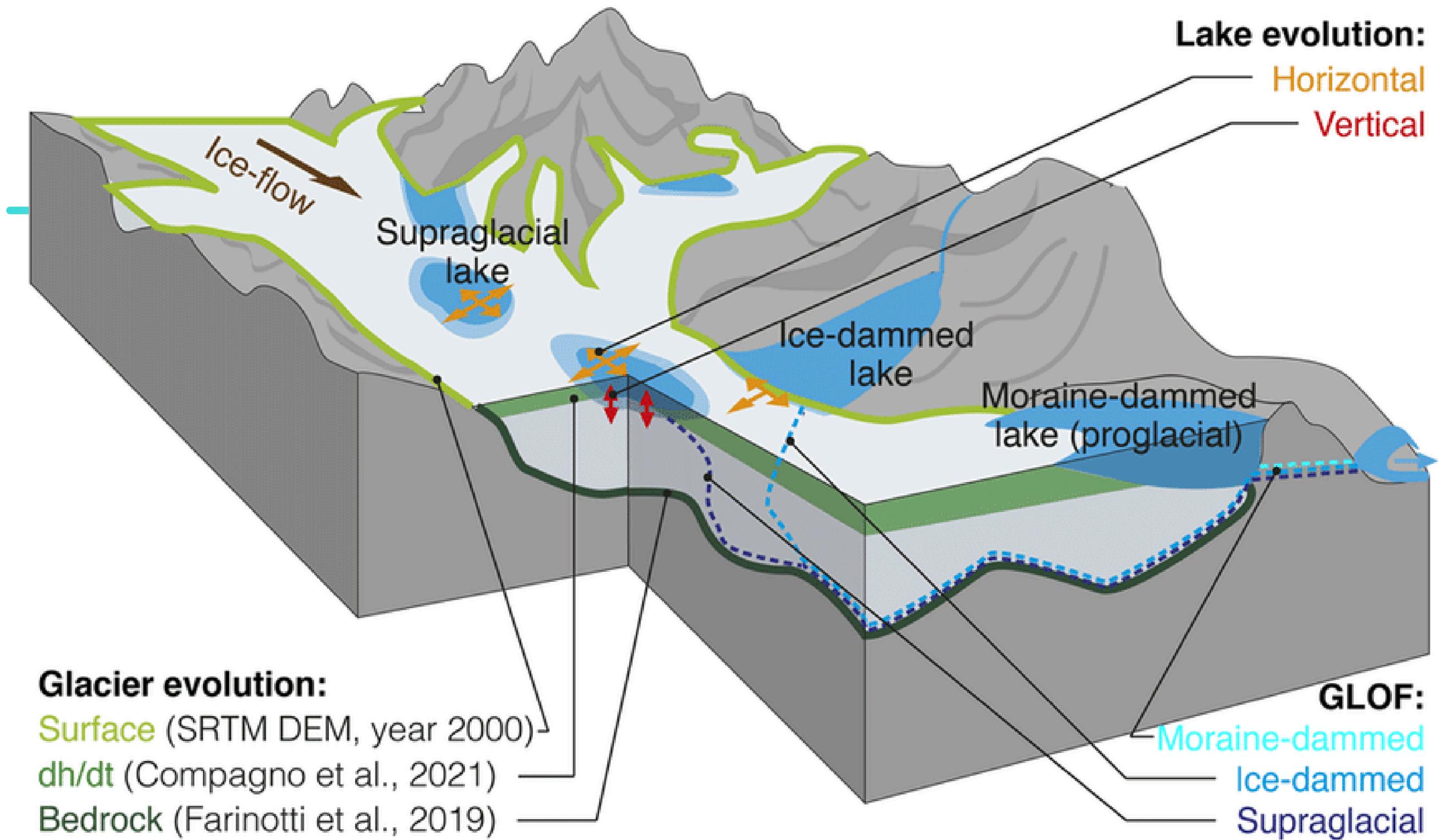


- **.The glacial lakes are categorised based on their formation process into four broad categories, namely Moraine-dammed (water dammed by moraine), Ice-dammed (water dammed by ice), Erosion (water dammed in depressions formed by erosion), and other glacial lakes.**
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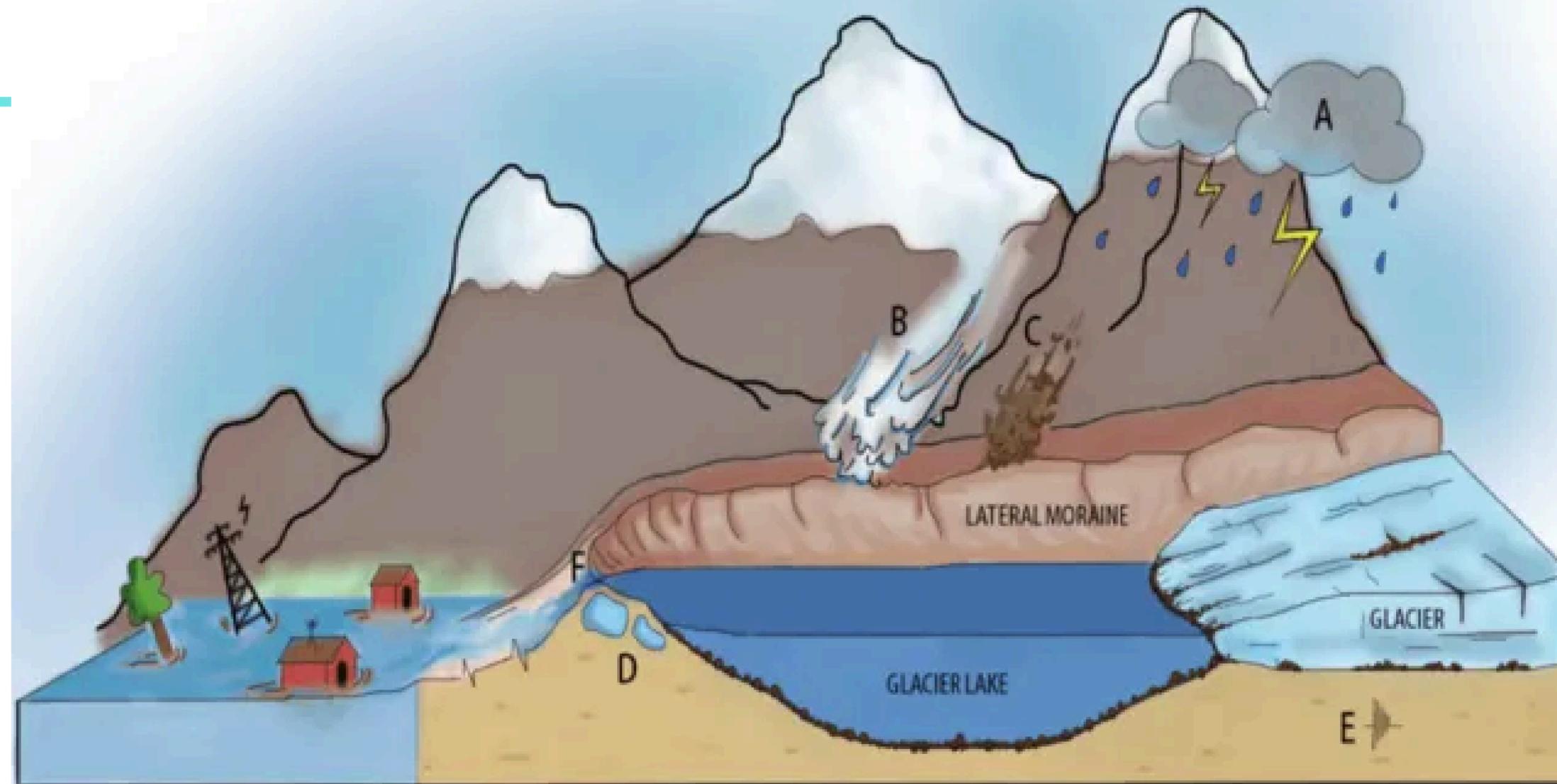
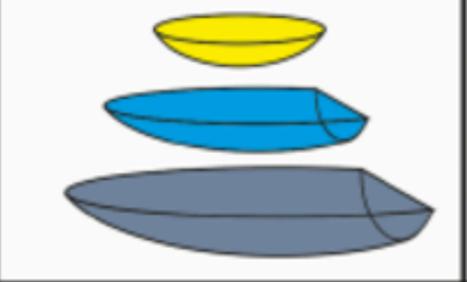
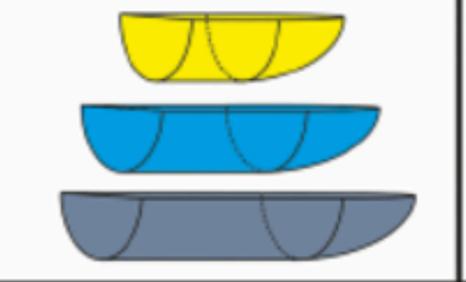
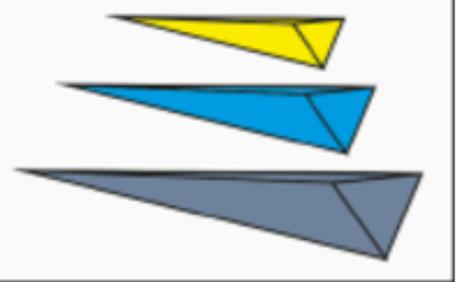
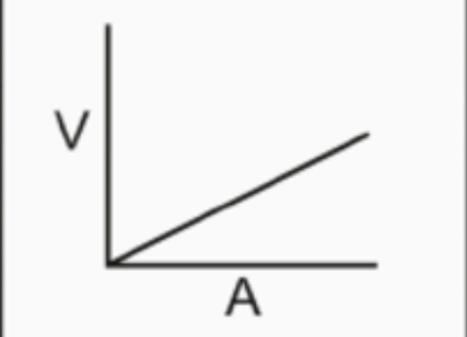
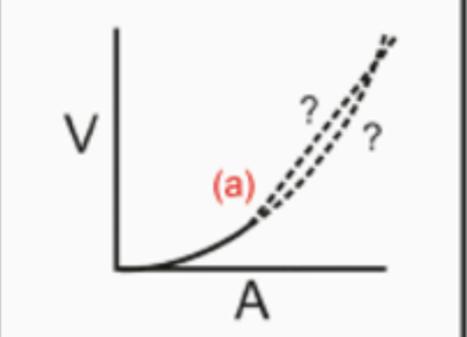
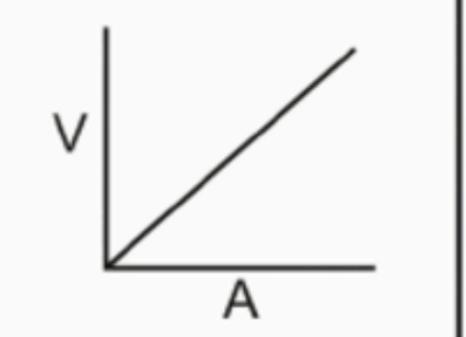


Figure-1: Illustrative graphic showing various reasons for GLOF occurrence
(A) Cloudburst (B) Snow avalanche (C) Landslide (D) Melting of ice in moraine
(E) Earthquake (F) Overflow

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	Supraglacial ponds	Supraglacial lake	Moraine-dammed lake	Ice-dammed lake
a				
b	Belvedere Lake, Italian Alps	Ngozumpa Tsho, Nepal	Tasman Lake, New Zealand	Kyagar Glacier, Pakistan
c	Kääb et al., 2003	Thompson et al., 2012	Dykes et al., 2011	Haemmig et al., 2014
d	Expand mainly via marginal melt so tend to be shallow but large areal extent	Expand rapidly via calving once fetch > ~80 m. Multiple calving faces may exist	Expand mainly via calving at glacier terminus. Bottom melting may be minimal	Deep, long, and narrow in areas of high relief. Ice-cliff may dam downstream end
e				
f				
g	Area and volume increase approximately linearly	Relationship may become linear after onset of calving (a)	Area and volume increase approximately linearly	Areal increase is initially dominant but becomes less so as basin fills

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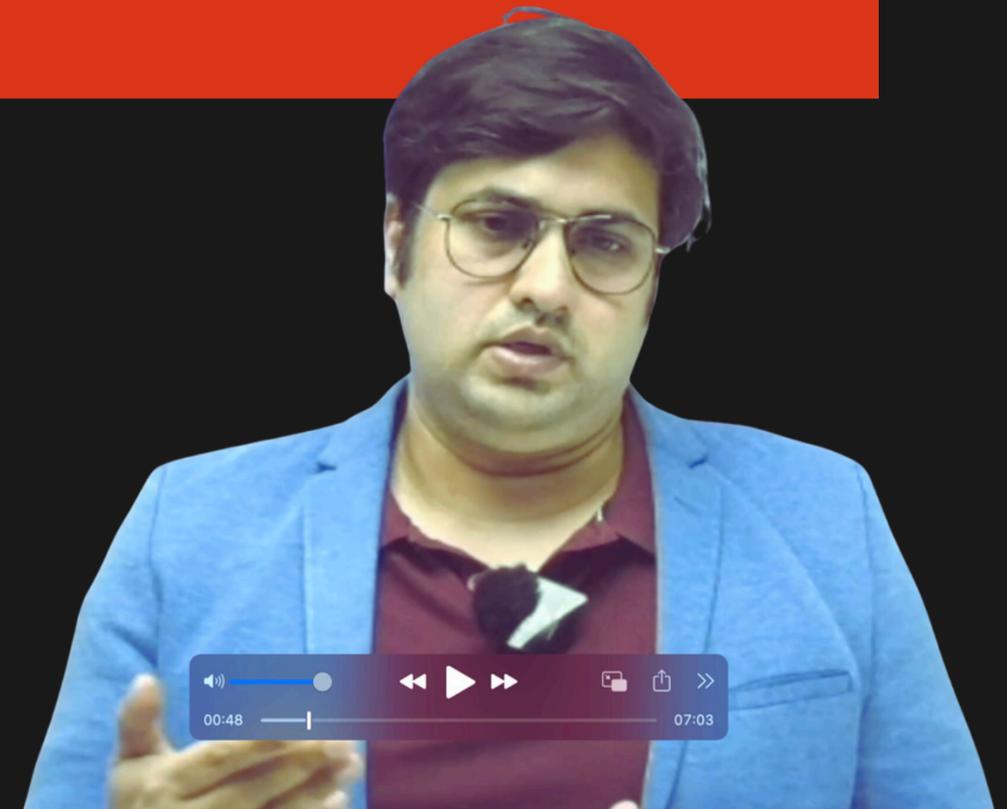
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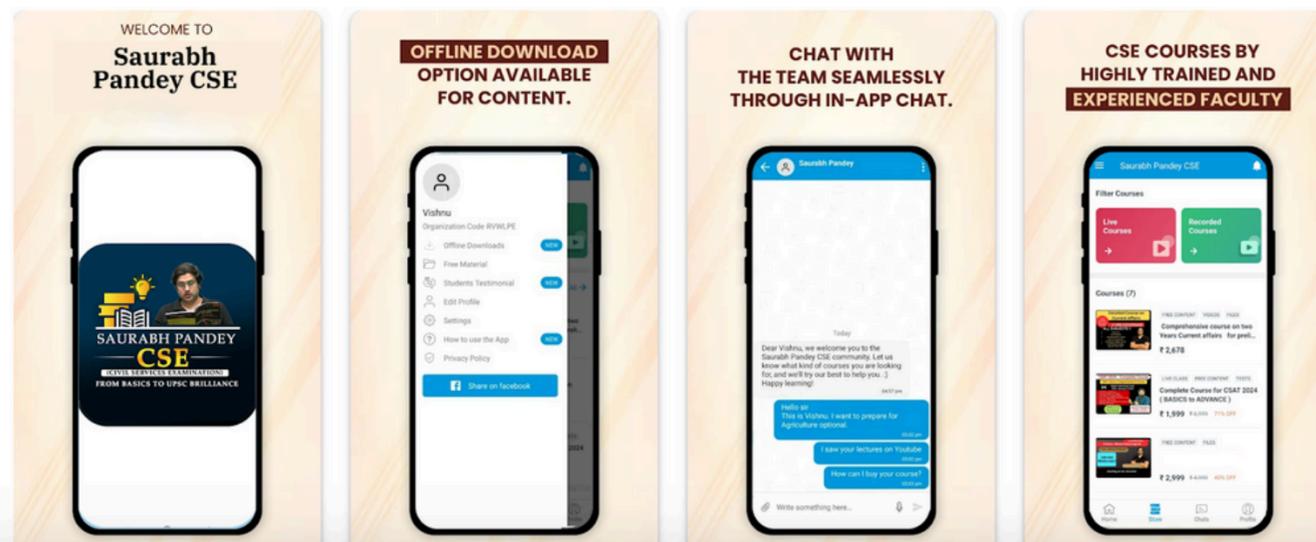
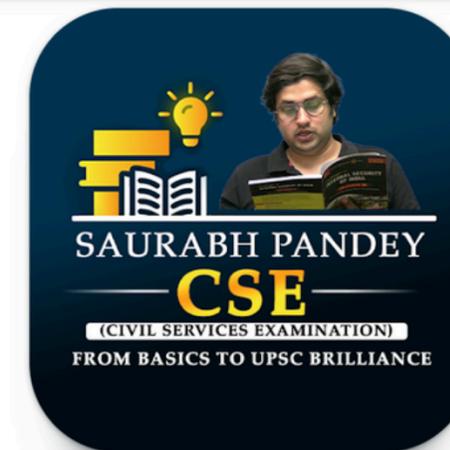
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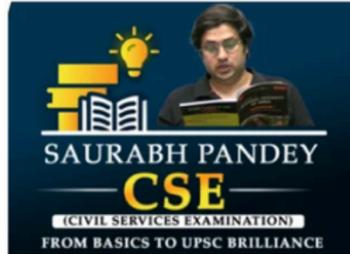
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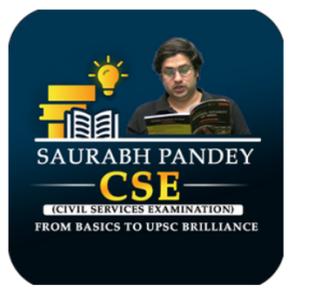
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