

YOJNA IAS

MONTHLY CURRENT AFFAIRS
OCTOBER 2022



YOJNA IAS

**Prelims
&
Mains**

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1/10/2022 TO 30/10/2022

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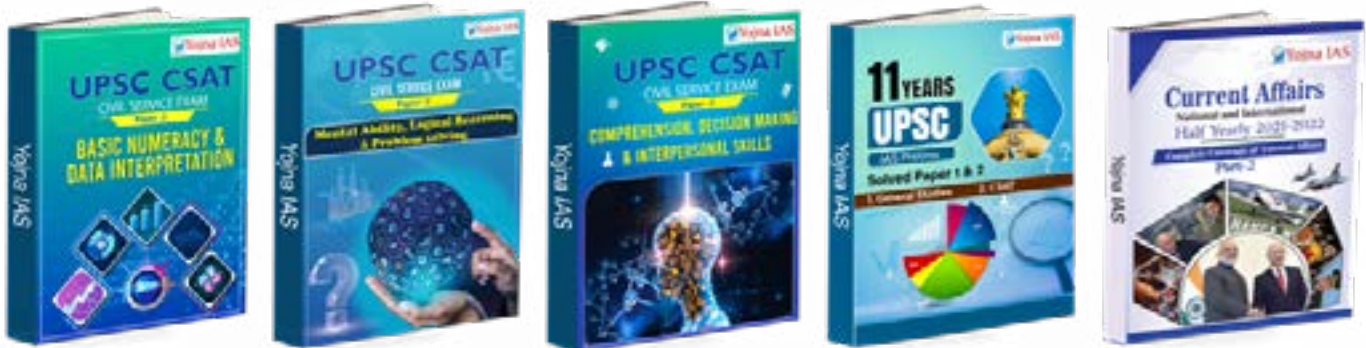
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Sources:

The Hindu | The Indian Express | The Economic Times | Press Information Bureau PIB News | PRS (Recent Bills and their analysis) | CPCB | NDMA|IDSA: Institute for Defense Studies and Analysis (For in-depth IR and Internal Security articles) unesco World Heritage Convention | BBC | NCERTs All standard reference books.

Yojna IAS Current Affairs Monthly Magazine covers a wide range of topics that overlaps with the CORE subjects.

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FOREWARD

Dear Aspirants,

Every one of you dreams and desires something to accomplish. Nobody can stop you from dreaming. Dreams are the only objective we all have and don't work until we do. Every new day, you dream of motivating yourself for a new purpose of improving your life. Preparing and nourishing the mind. Vanishing the failed person within us. Discard the obstacles, doubts and justifications. And that's how victory will arrive at you. One should realize the most achieving regions in the preliminary and main IAS examination. One should know which editions must be read and which books must be prevented. To achieve an IAS position with the least effort, candidates must be discreet.

This Exclusive Book has been prepared and compiled keeping in mind the needs of dedicated Aspirants looking for a Focused and Intensive Career.

Yojna IAS thrives on being the best step an Aspirant takes towards Their goal of becoming a Civil Servant.

Yojna IAS- Our Dedicated and Committed team has prepared this informative Book just for your better understanding. We know that Conceptual Clarity is necessary to clear any Competitive Examination. With the help of this Book, you can remove your doubts quickly. This Book has some excellent Information.

The Book has been arranged in a deeply chronological and story-like manner to make for an exciting reading and easy retention.

We Wish you Good Luck, Keep Believing in Yourself, and if you are well prepared, you will Succeed.

**Team of
Yojna IAS**

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CURRENT AFFAIRS

OCTOBER 2022

VOLATILITY IN RUPEE/ WEAKENING OF RUPEE

Source: The Hindu; The Indian Express

News: To tackle inflation the US Federal Reserve has hiked its interest rate leading to strengthening of the dollar against other currencies. Rupee also breached psychological marks of 81 and 82 against the dollar.

Current economic scenario across the globe in September:

- The Korean won and British pound have declined 6% against the dollar.
- Decline in the Australian dollar is 4.8% this month.
- Respective fall in Swedish krona, Chinese yuan, and Philippine peso is 4.6%, 4.1%, and 4.1% respectively.
- Similarly, the decline in the Indian Rupee is 2.6%.

Reasons for weakening of rupee vis-à-vis dollar:

- **Risk averse sentiments in the market** due to heightened probability of global recession.
- **Higher domestic inflation especially food inflation:** Compared to August 2021, Consumer Price Index (CPI) is up 1.70% from 5.30%, and Wholesale Price Index(WPI) is up 1.02% from 11.39%.
- **Foreign Portfolio Investment(FPI) outflows:** Outflows of approximately Rs.18,279 crore from Indian capital markets over the last six trading sessions.
- **Depleting forex reserves:** Due to Reserve Bank of India's intervention in the currency markets.
- **Continuous widening of trade deficit:** India recorded a current account deficit of \$23.9 billion or 2.8% of GDP in the first quarter or Q1 of this fiscal year(FY23).
- **Consecutive hiking of interest rates by the US Federal Reserve** for the third straight time and there is expectation in the market that interest rate will rise further.
- **Geopolitical uncertainties** due to the Ukraine war and volatile energy prices.

Impact of fall in the rupee:

- **Sustained fall in rupee** will create stress in pockets with rise in household expenses.
- **High import costs/bills** and will negatively impact companies which pay foreign companies royalties for franchises in India.
- **Depreciation of rupee will partly help the export sector**, as exports are influenced by global demand and currencies.
- Auto, real estate, infrastructure sectors, travelers and students studying abroad would be worst hit with fall in rupee.
- Rupee's fall will have a positive impact on the IT and banking sector.

Response of Reserve Bank of India(RBI) to smoothen the decline of the rupee:

- **Intervention in the forex market by RBI:** Due to RBI's action there is dip in Indian foreign exchange reserves.

Issues associated with RBI's intervention in the forex market

- Chances of burning out forex reserve in case of aggressive interventions.
- By managing exchange rate RBI is going beyond its mandate as RBI's main mandate is price stability through inflation containment.
- **Reflects short-sightedness on part of RBI:** In most cases, overshooting of the currency gets corrected after the event is over. So, instead of steering the currency in any direction, the aim should be to ensure that volatility is not too high.

Way forward:

- **Since the exchange rate is market-determined.** So, let the market forces play out. In the current economic scenario such as strengthening of dollar and deterioration of current account deficit, the RBI should limit its interventions in the currency markets allowing the currency to adjust by itself. RBI should intervene only if the rupee is on a sustained free fall.
- **RBI should address the real concern i.e. inflation** as the current situation is favorable due to ease in global crude and commodity prices. Recently in its monetary policy announcement, we believe the RBI hiked the interest rate by 50 basis point.
- **RBI should focus on a multi-pronged approach to increase the supply of U.S. dollars in the Indian market such as** easing provisions for remittances, allowing short-term foreign portfolio investments in government securities, etc and RBI should also introduce schemes to attract NRI investments.
- **Major policy tool that RBI should use is bridging the interest rate differential** through interest rate defence as managing volatility can give a panic signal to the market.
- **Long-term solution:** Finance the Current Account Deficit (CAD) with capital inflows, and prevent hot money outflow with the aid of interest rates.

Article:

1. **The Indian Express:** Let the rupee fall; Volatile INR still relatively stable; what now?
2. **The Hindu:** How much should India prop up the rupee?

Sharad



FALL OUT OF ANKITA MURDER CASE

Source: The Indian Express

News: Receptionist Ankita Bhandari's murder allegedly by the resort owner and two of his accomplices created anxiety and fear in the minds of young women and their parents.

Reasons for small town migration of young women/ girls:

- **Urban pockets are centers of hope** for educated girls from rural areas.
- **Upward mobility:** Urban centers promise potential for socio-economic independence to young girls enabling the enhancement of social status of families.
- **Lack of jobs in the local rural areas.**
- **Help young girls to move out of the rigid social control**
- **Dwindling rural household incomes** making it necessary for young girls from rural areas to contribute to family incomes for survival.
- **Lack of alternatives:** Most girls can not migrate to big cities due to difficulty in finding jobs and places to stay and precarious financial conditions. So, they prefer service sector jobs in small towns.
- **Patriarchal control and cultural norms** often prevent young women's migration for employment.

Challenges faced by women in urban centers to gain employment:

- **Multiple layers of vulnerabilities due to** low number of women at work spaces, lack of support systems and inaccessible grievance redressal mechanisms along with the marginalities of caste, class, religion, region, disability, gender and sexual identity.
- **Discriminatory nature of urban labour market:** Even after greater diversification of occupations in cities, most of the women's employment are concentrated in few occupational segments and sectors.
- **Manner of women's exclusion/inclusion in urban employment:** Age profile of the urban-bound women tilted towards younger age brackets due to increased education among girls and emergence of new services and occupations in urban centers.
- **Highly unregulated nature of employment:** Most of these women/girls are employed in informal services that are highly volatile in nature.
- **Social stigma due to stereotypes related to few jobs such as receptionist:** Hence, women have to fight against gendered notions both at the workplace and outside.
- **Precarious work conditions and difficulty in accessing employment** in urban areas due to lack of adequate information on the job profile, conditions of work including working time.
- Prevalence of non-uniform wage rates, the absence of defined working hours, incidences of violence and harassment including sexual harassment across sectors and locations.
- **Challenge of working in highly-gendered or misogynist work spaces:** Except few feminised

occupations most of the occupations are male dominated which throws up specific challenges of its own.

- **Renewed restriction** on mobility of young working women and girls due to media coverage of Ankita murder case.
- **Unawareness** regarding women's rights and laws around sexual harassment.
- **Absence of support systems** like familial protection and lack of civil society and non-governmental organisations (NGO) working for the cause of young working women.
- **Dysfunctional Local Complaints Committees and unresponsive police behavior** towards women employed in informal and unorganised sector. Hence, most women do not report their complaints regarding physical and sexual violence.

Way forward:

- **Coordination between state, private employers and co-workers** to build institutional support systems based on empathy and shared experience both inside and outside the workplace.
- **Mechanism should be built involving all stakeholders** to ensure justice, job security, physical safety, mental well-being and social acceptance for women.
- **Ensure proper implementation of POSH Act 2013** for regular reporting of sexual harassment cases at workplaces.
- Local governments along with private organizations can build sufficient numbers of working women's' hostels.

Article:

1. A jolt to the dream (Neetha N.)
2. What Ankita Bhandari's death reveals about patriarchy in the workplace (Somaya Gupta).

Sharad

RATIONALE BEHIND RAISING INTEREST RATES

Source: The Hindu

News: Central banks around the world often raise interest rates to curb inflation. Now, the question arises why central banks raise interest rates.

Rationale Behind Raising Interest Rates:

Increase in incentives to save and interest: As with the rise in interest rates borrowing cost also increases. So people prefer to invest for better yields.

Check inflationary spiral: Due to high interest rates consumption becomes expensive leading to reduction in demands for goods. Finally, the price of goods dropped followed by reduction in wages. In the end the economy witnesses sustained drop in price levels hence forestalling inflationary spiral.

Raising rates quickly drains excess liquidity from the market: As burden on the borrowers increase in real terms as real rates also go up with rise in interest rates.

Rise in interest rates led to exponential contraction in the monetary system: In banks, the amount of initial deposit grows multi fold due to loans issued against the deposit as banks operate on the basis of fractional reserve banking system. So, monetary systems contract exponentially when debt is paid off or defaulted.

Correction of asset prices: High interest rates led to lower consumption therefore, a nominal decline in profit. So, stock prices of firms drop.

Decrease in inflationary pressures: As new loans become more expensive, and therefore, slow down in new borrowings.

Impact future cash flows: Higher interest rates would result in earnings being discounted at higher rates, which would decrease the value of future cash flows compared to a low-interest rate regime.

Effects opportunity cost in case of fixed-income securities: With rise in rates the security price corrects to account for the rate increase.

Rise in interest rates led to decline in gold prices: Gold moves in comparison with the dollar. Appreciation in the dollar aids depreciation in gold prices. Opportunity cost of holding gold measured in terms of the interest rate received on U.S. Treasury Bills (T-bills). Since, the interest rate of the U.S. T-bills are on the rise. Therefore, there is a decline in gold prices with a rise in rates.

Consequences Of Rbi's Relentless Defence Of Rupee:

Due to artificial elevation of the rupee imports are becoming artificially cheaper and exports artificially expensive.

Domestic producers of developed countries are becoming more competitive due to appreciation of rupee against the pound and Euro.

Countries which let their currencies depreciate such as Bangladesh, Vietnam and China enjoy the benefits of being more competitive with their exports.

Negative impact on IT & pharma industries: Defence of the rupee led to price corrections in the IT and pharma industries.

Probability of widening trade deficit as artificially strong rupee means lower sales revenue and profit.

Requires greater intervention by the central bank(RBI) to maintain the current exchange rate in case trade deficit widens due to artificially strong rupee.

Rupee may crack due to pressure on domestic exporters and the trade balance:

As India has elastic exports and inelastic imports. Exports demand decreases during recessions while demand for imports stays constant during a downturn.

RBI's relentless defence of rupee led to the decline in gold prices: Gold prices in India fluctuates according to the U.S. dollar and rupee exchange rates. Depreciation of rupee more than gold against the dollar led to increase in the price of gold and vice-versa. But gold prices have declined due RBI's relentless defense of rupee, and selling U.S. securities to cushion the outflow.

Article: Rationale behind raising interest rates(Anand Srinivasan;Sashwath Swaminathan)

Sharad



TOKENISATION OF CARDS

Source: The Indian Express

News: For security and safety of card transactions Reserve Bank of India started card-on-file (CoF) tokenisation from 1st October.

Concept of Card tokenisation:

- Tokenisation is replacement of actual card details with a unique alternate code or 'token'.
- Generated token through tokenisation shall be unique for a combination of card, token requestor and the device.
- Establishment of a new entity known as Token requester for processing tokenisation requests of consumers.
- No charge for availing tokenisation service.
- Institution that can offer tokenisation services: Any authorized card network having original Primary Account Number (PAN) can perform card Tokenisation.
- Card networks have to ensure integrity of the token generation process through adequate safeguards so that PAN cannot be found out from the token and vice versa, by anyone except the card network.

Mechanism of Card tokenisation:

- First Step: Initiation of request by debit or credit card holders on the app provided by the token requester.
- Second Step: Token requester forward the request to the card network.
- Third Step: After taking consent from the card issuer, the token requester issues a token corresponding to the combination of the card, the token requester, and the device.
- Working Mechanism: Instead of actual card details a unique token will be stored on the server for online transactions. When a transaction is made, a merchant or transaction platform sends out a message to Visa or Mastercard or a payment gateway asking for a token against that card number and this request for token then passed to the respective banks for transaction.

Card tokenisation facility is available to:

1st Category: Initially, facility for card tokenisation was available for card holders's mobile phones and tablets.

2nd Category: Further RBI extended the scope of tokenisation. Now, it includes consumer devices such as laptops, desktops, wearables (wrist watches, bands, etc.) and Internet of Things (IoT) devices.

Benefits Associated With Card Tokenisation:

Safe: As actual card details are not shared with the merchant during transaction processing. Also token requestor cannot store Primary Account Number (PAN), or any other card detail.

Secure: Relevant details such as actual card data, token etc are stored in a secure mode by the authorised card networks.

Conformation to international best practices/globally accepted standards for safety and security: Token requester needs to be certified for safety and security through card networks.

Protection of customer's card details from data breach or hacking attempt due to generation of card and merchant specific token.

Tokenization lends greater credibility to seamless and secure payments experience.

Article: Tokenisation for credit and debit card transactions: What is it, and how does it help you?

Sharad

BAY OF BENGAL INITIATIVE FOR MULTI-SECTORAL TECHNICAL AND ECONOMIC COOPERATION (BIMSTEC)

Source: The Hindu

About BIMSTEC:

- BIMSTEC is a multilateral regional organisation composed of **7 members**.
- **Member countries:** Bangladesh, Bhutan, India, Nepal, and Sri Lanka, Myanmar and Thailand.
- Official headquarters of BIMSTEC is located in Dhaka and Sri Lankan diplomat Sumith Nakan-dala was appointed as its first Secretary General.
- Current Chair of BIMSTEC is **Sri Lanka**.
- BIMSTEC is a sector-driven organisation unlike SAARC or ASEAN. It means that the goals or areas of cooperation are divided between members. **For Example:** Initially, India was responsible for areas like transportation, tourism and Counter-Terrorism.
- **Current Status:** During the current summit i.e. fifth summit decision was taken for complete reorganisation of cooperation activities into seven pillars instead of 14 sectors.
- **In its Fifth summit**, BIMSTEC adopted a formal document or organisational architecture in the form of the BIMSTEC Charter. Adoption of masterplan for transport connectivity in the Bay of Bengal region at the current summit.
- **India's role:** India is aspiring to be BIMSTEC's pillar for security through areas of counter Terrorism and Transnational Crime (CTTCC) Disaster Management and Energy.

History of BIMSTEC:

- In 1997 through the Bangkok Declaration Bangladesh, India, Sri Lanka and Thailand formed **BIST-EC**.
- After the entry of Myanmar in late 1997 it became **BIMST-EC** (Bangladesh, India, Myanmar, Sri Lanka and Thailand Economic Cooperation)
- Nepal and Bhutan joined BIMSTEC in 2004.

Aim of BIMSTEC:

- To accelerate shared growth and cooperation between littoral and adjacent countries in the Bay of Bengal region.
- **To bring a sense of community among the members of the Bay of Bengal region:** Bay of Bengal region lost its early twentieth century integration in the 1940s due to separate goals and alliance systems pursued by members of the region.
- **Rediscovering common heritage around the Bay of Bengal** by reviving the connectivity and common interests of the members of the Bay of Bengal region.
- According to BIMSTEC official websites "the regional group constitutes a bridge between South and South East Asia and represents a reinforcement of relations among these countries."

Working mechanism of BIMSTEC:

- BIMSTEC has a working mechanism for policy making and operational goals.
- Policy making is done through summits and ministerial meetings. Summits are supposed to be held every two years; and ministerial meetings of Foreign and Commerce Ministers of member countries for deciding on trade and economic affairs, to be held once every year. To monitor the activities of the grouping an operational meeting of senior officials is supposed to be held twice a year.
- BIMSTEC Working Group acts as the coordinating body of BIMSTEC and also responsible for reviewing the progress of the regional grouping.
- Chairman of BIMSTEC Working Group is selected on the basis of rotation.

Significance of BIMSTEC:

- BIMSTEC member states have a combined GDP of US\$3.697 trillion/per year also it hosts 22% of the world population.
- Supports India 's initiatives such as 'Act East' policy (regional cooperation with southeast Asia countries) and concept of the 'Indo-Pacific' region.
- BIMSTEC will help India to gain trade and security prominence in the Indian Ocean region.
- **India may become Net Security Provider** in the Bay for maintaining peace and security,
- **Significance of BIMSTEC is different for different countries:** For Bangladesh, BIMSTEC provides much-needed economic development. For Sri Lanka, it offers potential for becoming a shipment hub in the Indo-Pacific region. For landlocked countries such as Nepal and Bhutan BIMSTEC grouping serves as a pass to the sea. For Myanmar and Thailand, the grouping will help to reduce over-dependence on China and will provide a huge consumer market for its commodities.
- **Potential to prevent China from making inroads in the Indian Ocean Region:** Over the years, China is making inroads in the Indian Ocean Region. China is building massive infrastructure in South and Southeast Asian countries, under projects such as Belt and Road Initiative (BRI). All BIMSTEC members except India and Bhutan are covered under BRI projects.
- BIMSTEC is important for utilizing the full land and maritime trade potential of the member countries.
- **An alternative platform for cooperation among South-Asian Countries:** As it helps India to bypass Pakistan's obstructionist approach to the South Asian Association for Regional Cooperation (SAARC).
- Development of BIMSTEC Energy Center and BIMSTEC Business Council for cooperation in trade and energy.
- **Help in developing maritime trade and tourism in the Bay of Bengal:** As Bay of Bengal has coral reefs of around 8,471 sq.km an important source of natural resources for a coastal population. Bay has an annual fish catch of around six million tonnes, constituting 7% of the world's catch.

Bottlenecks in BIMSTEC:

- **Lack of efficiency due to inconsistency in holding policy making and operational meetings:** BRICS summits are supposed to be held every two years. But since inception just five summits have been held in 25 years.
- **“Sluggish” pace of BIMSTEC’s progress:** Due to inadequate financial and manpower assistance to BIMSTEC secretariat for its operational activities.
- **India’s selective approach towards BRICS:** India starts taking interest in BIMSTEC WHEN SAARC is hamstrung due to Pakistan.
- **Insufficient connectivity and transnational trade among BIMSTEC members:** India’s percentage of annual trade with BIMSTEC countries as a percentage of its total foreign trade was just 4% in 2020. Most of the time BIMSTEC member countries import goods from other non-member countries.
- **Absence of shared and lucrative coastal shipment ecosystem** among BIMSTEC members led to frequent detention of fishermen who cross territorial borders.
- **Difficult relations between member countries such as the** Rohingya refugee issue between Bangladesh-Myanmar; India-Nepal border issue; hostile political situation in Myanmar due to takeover by Military junta.

Summary: Economic integration of countries surrounding Bay of Bengal will spur the animal spirit required for development of these countries. Sector driven approach of the BIMSTEC provides each member to develop their economy according to their strengths and weaknesses. Being the largest country among the BIMSTEC members India should provide leadership to the BIMSTEC.

Article: Explained | What is the BIMSTEC grouping and how is it significant?

Sharad

PRADHAN MANTRI GARIB KALYAN ANNA YOJANA (PM-GKAY)

Source: The Indian Express

News: Government extended the food grain distribution under Pradhan Mantri Garib Kalyan Anna Yojana (PM-GKAY) for another three months until December 2022.

About Pradhan Mantri Garib Kalyan Anna Yojana (PM-GKAY):

- In this scheme, free food grains (5 kg per person per month) were provided to eligible beneficiaries of the National Food Security Act (NFSA), 2013 by the government.
- Food grains provided under PM-GKAY are over and above the monthly entitlement of the beneficiary under the NFSA.
- PM-GKAY is channeled through the Public Distribution System(PDS).
- It provided an effective social safety net during the pandemic and helped the government to dispose of excess grain lying in warehouses.
- Only people covered under NFSA receive free food grains under PM-GKAY.
- Government announced this scheme on March 26, 2020 as a component of Rs 1.7 lakh crore Covid relief package announced just two days after the country went into national lockdown following the outbreak.

Phases of PM-GKAY: Initially, the scheme was only for three months i.e. April to June 2020. But the scheme keeps on getting extended.

- **First Extension:** On July 8, 2020, it was extended for five months from July to November 2020.
- **Second Phase:** Government restarted the PM-GKAY in March-April 2021 when the second Covid-19 wave hit the country.
- **Third Extension:** The scheme was approved for another two months from May and June 2021.
- **Fourth phase** of the scheme is from July to November 2021.
- **Fifth phase** when the government decided to continue the scheme till the end of March 2022.
- **Sixth phase:** The Union cabinet headed by PM Modi extended the scheme until December 2022.

National Food Security Act (NFSA), 2013:

- **Aim of the NFSA:** To ensure “access to adequate quantity of quality food at affordable prices” to 50 per cent of the urban and 75 per cent of the rural population of the country.
- Under this food law food grains are provided to eligible beneficiaries at highly subsidised rates. In this scheme.
- Under this scheme, the cost of rice, wheat and coarse grains is Rs 3 per kg, Rs 2 per kg and Rs 1 per kg respectively.
- Antyodaya Anna Yojana (AAY) households, and the Priority Households (PHs) are two categories of beneficiary households under the NFSA.

- **Entitlement under AAY:** Every month 35 kg of foodgrains provided to each AAY household irrespective of the number of members in the household.
- **Entitlement under PHs:** Every month each member of a PH receives 5 kg of foodgrains under the NFSA. Quantity of foodgrains disburse to households under PHs depends upon number of family members. So, the bigger PH family gets the greater quantity of foodgrains.
- Coverage under NFSA: 67.5% is the overall national coverage of the NFSA .

Difference between PM-GKAY and NFSA:

- The PM-GKAY is a programme introduced by the executive just as a top-up to the entitlements of beneficiaries covered by the NFSA, whereas the NFSA is a right-based programme under a law of Parliament.
- PM-GKAY does not cover additional beneficiaries beyond the accepted limit of 81.35 crore persons under the NFSA.

Issues associated with extension of PM-GKAY:

- **Politicization of the scheme:** There are allegations against the government that it keeps on extending PM-GKAY keeping assembly elections in mind.
- **Low utility:** As godowns are no longer overflowing and most economic activity resumed to near -normal level.
- **Other issues** such as failed wheat crop and uncertainty over the kharif rice about to be harvested.
- **Possibility of more diversion of food grains** as open market prices are hardening, current retail price of wheat and rice is Rs 31 and 38 per kg. So, in this case increasing food grain quantity for distribution would result in poor getting less and not more.
- **Continuous extension may affect fiscal prudence** due to increase in food subsidies burden with the announcement of PM-GKAY.
- **Depletion in stocks of grains due to doubling free rations** and less procurement of wheat may fail to curb inflationary expectations in the country.
- Current situation demands the government to raise the minimum support price (MSP) of wheat to replenish wheat stocks in FCI godowns. But, this will put an undue burden on minimum support price (MSPs) and the fiscal deficit.

Conclusion: PM-GKAY is introduced to ameliorate the distress due to Covid lockdowns. But, current economic situation requires doing away with perverse subsidies through limiting the PDS coverage to 30% of the bottom population and fixing the issue prices of PDS supplies at half the MSP.

Article: Inflation-climate change link(Ashok Gulati);Free grain scheme needs to be backed by imports to cushion wheat prices; Three more months of free food grains for poor: economics & politics of PM-GKAY

URBANIZATION, THEIR PROBLEMS AND THEIR REMEDIES

News: In recent years most urban centers such as Delhi (2013, 2021), Mumbai (2005, 2017), Chennai (2015, 2021), and Hyderabad (2020) and recently Bengaluru faced extensive losses to property and life due to adverse weather phenomena that brought the city to its knees.

Impact of these events:

- **Adverse social and human costs** as these events disproportionately affect the poorer sections of society
- **Disruption to environmentally vulnerable areas** as several informal settlements were also destroyed.

Issues with response to these adverse weather phenomena:

- These events show lack of preparation on part of urban authorities.
- Reflects knee-jerk reactions of policy makers.
- Most activity by the administrators like river/drain cleanup measures, anti-encroachment drives, and stormwater network projects appears to appease the public and the media.
- **Lack of climate consciousness in the planning process:** Due to dearth of climate mitigation measures in urban planning and the uncontrolled urban sprawl.
- **Absence of master plan across India for urban settlements:** Approximately, 65% of urban settlements do not have a master plan and even if they exist, they usually do not address issues related to environmental protection or climate change mitigation.
- **No statutory backing to the master plan** developed by city administrations dealing with drainage/flood mitigation.
- **Centralisation of urban environmental governance:** Most of the power to prepare a master plan to address issues of environmental protection remains with the State government while city governments are reduced to 'stakeholders' without much authority.
- **Issues of credibility:** Most climate action plans developed by city administrations such as Mumbai, Ahmedabad, and Nagpur (among others) lacks element of public participation.

Way forward:

- **Systemic solutions** to urban issues instead of a piecemeal approach.
- **Creation of a comprehensive climate action plan** for all key Indian cities with statutory backing.
- **Institutionalise public consultations processes** within the plan preparation so that it effectively addresses the issues of underserved neighbourhoods.
- **Environmental protection agency** along the lines of the unified transportation authority formed by different cities for coordinated action to tackle issues related to climate change.

Article: Calamity-prone — urban India's worrying storyline(Venkat Jayagopi;Venika Menon)

Sharad



GOVERNOR AND STATE LEGISLATURES

Source: The Hindu

News: Delay in Governor's assent to certain bills passed by Kerala and Tamil Nadu legislative assemblies is creating uncertainty around legislative programmes of the government.

Governor's role in law making:

- Although the governor is appointed by the Central government, he is part of the state legislature. No bill can become law without his assent. After the assent of the governor bill passed by legislative assemblies transformed into law.
- According to Article 161 the Governor is bound by the advice of the State's Council of Ministers.
- In its recent judgment Justice Rao of SC reiterated that Governor of a State is "but a shorthand expression for the State government".

Current controversies:

- Delay by Tamil Nadu Governor in forwarding the Bill for exemption from the National Eligibility cum Entrance Test (NEET) to the President.
- Public announcement by Kerala governor that he would not give assent to the Lokayukta Amendment Bill and the Kerala University Amendment Bill.

Article 200 of the constitution provides certain rights to governor when Bill reaches him from Assembly:

- **First option:** The Governor can give assent to the bill.
- **Second option:** Bill can be sent back to the assembly requesting lawmakers to reconsider some provisions of the Bill, or the Bill itself.
- **Third option:** The Governor can reserve the Bill for the consideration of the President.
- **Fourth option:** The Governor can withhold the assent to the bill.

Analysis of Article 200:

- **It affirms the primacy of the legislature in legislative exercise:** As the Governor has to give assent to the bill, if the assembly passes the bill again without any changes and sends it back to the governor.
- **Various court orders provide certain discretion to the governor** on the matter of sending Bills to the President. But, according to constitution only that Bill can be reserved for the consideration of the President, if in the opinion of the Governor it endangers the position of High Courts with respect to its power.
- **Fact that the Article 200 does not mention the grounds on which assent to the bill can be withheld,** reflects that this power should be utilized sparingly by the governor after careful consideration.
- Legislative assemblies reflect the will of the people as these are constitutionally designated to make laws.

- Governor's refusal to assent to the bill not only defeats the legislative programme of the elected government, but it is also against the spirit of the Constitution.

International practices with regards to assent of the bill:

- **United Kingdom:** Royal assent is necessary for any Bill passed by the Parliament to become a law, but the crown can withhold assent to the Bill. But, currently in practice and usage there is no veto power exercised by the crown. Moreover, Bill is treated as unconstitutional if royal assent is refused on the ground that the monarchy strongly disapproves of the Bill or very controversial Bill.
- **United States:** According to the Constitution, the President can refuse assent and return a Bill to the House but if both Houses pass it again with two thirds of majority the bill becomes a law.

Issues associated with assent power of Governor:

- **Legislative exercise becomes futile** if the Governor withholds assent to the Bill as no remedy is provided by Indian Constitution in such a situation.
- **Constitutional challenge if the state government challenge the refusal of assent by the Governor in court:** As Article 361 provides complete immunity to the Governor for any act done in exercise of their powers.
- **Illogical scheme in the Constitution:** Governor can indefinitely sit on the Bill passed by an Assembly. As Constitution does not fix any timeline for the Governor to decide the question of assent.

Way Forward:

- Governors, being a high constitutional authority, should not act in an arbitrary manner and give reasons while refusing to give assent to the Bill.
- Supreme Court judgment in **Rameshwar Prasad and Ors. vs Union Of India and Anr** reiterates the point that If the Governor refused the assent to the Bill with malafide intentions, the Governor's action of refusal could be struck down as unconstitutional.

Article: Gubernatorial procrastination is unreasonable (P.D.T. Acharya)

Sharad

INSOLVENCY AND BANKRUPTCY CODE (IBC)

Source: The Hindu

News: India's Insolvency and Bankruptcy Code is losing its relevance as haircuts of 100 out of 500 companies were above 90%.

Haircut in Banking: When banks willingly made a reduction in loan amount. For Example: Bank took 20% haircut, if in case of Rs1000 loan amount it agrees to receive only Rs800. Banks do haircuts where there is a bleak chance of full recovery.

Currently under IBC haircut is looked at as the difference between the creditor's claims and the actual amount realized.

Insolvency and Bankruptcy Code:

- It aims to overhaul the corporate distress resolution regime in India.
- Focus of IBC is the creditor-in-control model as opposed to the debtor-in-possession system.
- IBC aims to create a time bound mechanism for resolutions through consolidation of previously available laws such as Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act (SARFAESI), Lok Adalats, and Debt Recovery Tribunals etc.
- **Resolution or liquidation** are two options when insolvency is triggered under the IBC.
- In case all attempts to resolve the insolvency under IBC fails, the company's assets are liquidated.
- IBC also provides for pre-pack resolutions for defaults not exceeding Rs. 1 crore where creditors and owners of a business agreed out-of-court settlement for selling business to an interested buyer.

Objectives of IBC as defined by the Insolvency and Bankruptcy Board of India (IBBI):

- Resolution for saving critical business through restructuring, change in ownership, mergers and other methods.
- Maximizing the value of assets of the corporate debtor.
- Promoting entrepreneurship, availability of credit, and balancing the interests.

Importance of Insolvency and Bankruptcy Code(IBC):

- Insolvency helps a growing economy like India, a healthy credit flow and generation of new capital.
- **Helps credit to not get stuck in the system or turn into bad loans:** Insolvent or "sick" companies begin to default on their loans. So through IBC banks or creditors quickly recover as much as possible from the defaulter.
- **Insolvency pumps fresh credits into the system and minimizes value degeneration of assets:** As businesses get a chance to start afresh with new owners, or its assets can be liquidated in

a timely manner.

Process followed under the IBC:

- Initiation of Corporate Insolvency Resolution Process (CIRP) under Section 6 of the IBC by creditor or debtor in case of defaults by a corporate debtor (CD).
- Initially the creditor or debtor could apply for insolvency at the minimum default of ₹1 lakh, but due to stress on companies due to the pandemic the government increased the minimum amount to ₹1 crore.
- **Adjudicating authority (AA) under the IBC:** Various National Company Law Tribunal (NCLT) benches across India.
- The Tribunal can admit or reject the application within 14 days and in case of delay of admission of application, the Tribunal has to provide reason.
- After an application is admitted by the AA CIRP or resolution process begins. Resolution process must be completed within 330 days.
- **Role of interim resolution professional (IRP) appointed by AA:** IRPs can be anyone from experienced and registered chartered accountants, company secretaries, lawyers and so on. After appointment IRP:
 1. Takes control of the defaulter's assets and operations.
 2. Collects information about the state of the company from Information Utilities (repositories keeping track of the debtor's credit history)
 3. Coordinates the constitution of a Committee of Creditors or CoC with financial creditors of a defaulting company.
- **Role of CoC:** CoC in every CIRP decides the viability of the defaulting company for restructuring or liquidation. It is the responsibility of CoC to appoint an insolvency professional (IP) to look after the operations of the company during the CIRP. Proposal for resolution of a company such as restructuring of debt, merger or demerger of the company examined by IP after that it submits eligible plans to the CoC and plan is approved by CoC if it receives 66% of the voting share of committee members. Company goes for liquidation if CoC fails to approve any resolution plan.
- CoC needs to submit an approved plan to the Tribunal before 330-day (deadline), If tribunal approves the plan then the debtor is bound to implement. The plan can also be rejected by AA
- Now, pre-packs or pre-pack insolvency resolution processes (PIRP) are also available for Micro, Small, and Medium Enterprises (MSMEs).

Challenges for the IBC:

- **Failure of IBC:** In the last six years approximately 3,400 cases (IBBI) were admitted under the IBC but only 14% could find a proper resolution and more than 50% of the cases ended in liquidation.
- **IBC failed to adhere to its time-bound mechanism even after so much amendment of the deadline:** Current timeline for the resolution process is 330 days. According to experts the average number of days to resolve insolvency cases increased rapidly over the past five years. For

Example: The resolution of cases involving businesses that owed more than 1,000 crore, however, took 772 days in FY22.

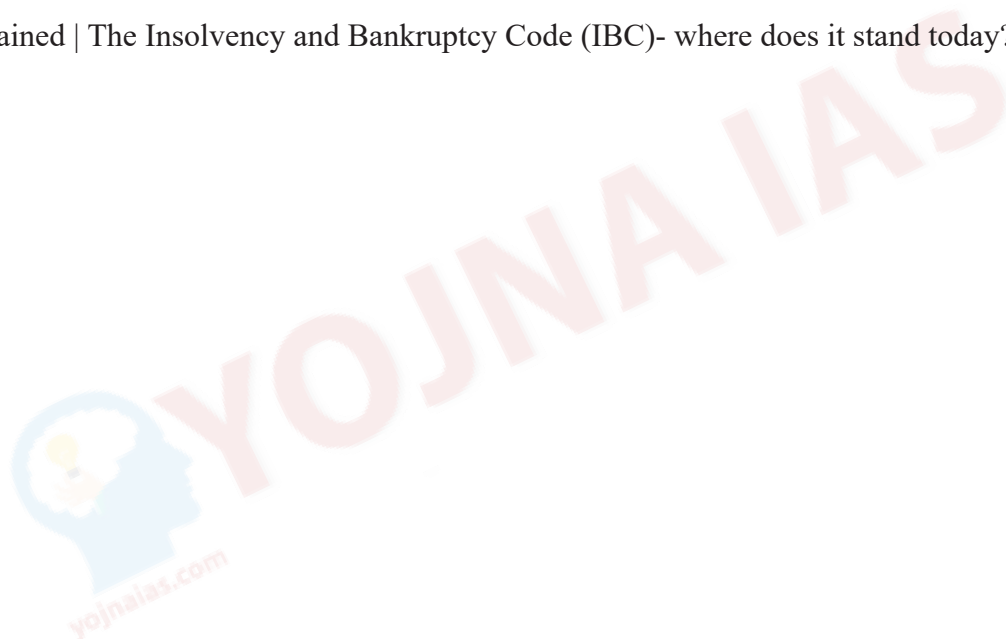
- **Issue of haircuts:** According to the Parliamentary Standing Committee on Finance, average haircuts borne by creditors in the last five years of IBC is 80% in more than 70% of the cases. Example: Haircut borne by creditors during resolution of Videocon Group case was 95.3.

Way Forward:

- **Implementation of suggestion by the Parliamentary Standing Committee** that after filing resolution the time taken to admit the insolvency application and transfer control of the company to a resolution process, should not be more than 30 days.
- **Introduce new yardstick to measure haircuts:** IBBI suggested that haircuts should be looked as the difference between what the company brings along when it enters IBC and the value realized.

Article: Explained | The Insolvency and Bankruptcy Code (IBC)- where does it stand today?

Sharad



Nobel Prize for Physiology or Medicine

Source: The Hindu; The Indian Express

News: Recently Swedish scientist Svante Pääbo was awarded the Nobel Prize in medicine for mapping the Neanderthal genome.

About Nobel Prize:

- Alfred Nobel(inventor of dynamite) established prizes in medicine, physics, chemistry, literature and peace.
- First Nobel awards in medicine, physics, chemistry, literature and peace were handed out in 1901.
- The Nobel in economics, officially known as the Bank of Sweden Prize in Economic Sciences, was created by Sweden's central bank in 1968 in memory of Alfred Nobel.
- Each prize worth of 10 million kronor (nearly \$900,000) is handed out on Dec. 10 the date of Nobel's death with a diploma and gold medal.
- Anyone from around the world such as university professors, lawmakers, previous Nobel laureates and the committee members themselves are eligible to submit nominations for the Nobel Prizes.
- According to the wish of Alfred Nobel, the Nobel Peace Prize is presented in Norway while the other awards are handed out in Sweden.



Key Contributions of Svante Pääbo:

- Developed research methodologies to extract 'clean' DNA from thousands of years old human fossils.
- Evolve methodologies to read the genetic information contained by old fossils.
- Earlier **Deduction method** were used by scientists where after studying genomes of current human beings extrapolate the information into the past. Paabo's methodologies have eliminated scientifically valid but indirect and uncertain deduction methods and rely on direct observation. **For example:** His revelation that one particular skull bone, called petrous, preserves DNA better than the rest of the body was very useful in knowing genetic information.
- He has been awarded Nobel Prize for Physiology for the year 2022 "for his discoveries concerning the genomes of extinct hominins and human evolution."

- Academy said in its press release that through his pioneering research, Svante Pääbo accomplished something seemingly impossible: sequencing the genome of the Neanderthal, an extinct relative of present-day humans.
- Paabo also discovered the existence of **Denisovans (an unknown sub-species of the human family)** who lived around the same time as the Neanderthals.

Importance of Svante Pääbo's discoveries:

- His research established an entirely new scientific discipline known as **paleogenomics**.
- Helps the scientific community to better understand human evolution and migration. **For Example:** Scientific community got indications from powerful sequence analysis that archaic hominins may also have mixed with Homo sapiens in Africa. But, accelerated degradation of archaic DNA in tropical climates lead to failure in sequencing genomes from extinct hominins in Africa.
- Through **Svante Pääbo's discoveries**, the scientific community understood the influence of archaic gene sequences of human's extinct relatives on the physiology of present-day humans. **Examples:** Present day Tibetans can survive on high altitudes due to the presence of **Denisovan version of the gene EPAS1** among them and also immune response to different types of infections are affected by Neanderthal genes.
- Paabo's research has shown that the **Neanderthals and Denisovans** are not only ancestors of modern humans, but also co-existed for about 20,000 years, during which they interacted and inter-bred with each other. **Example:** Some modern human population contains approximately one and three per cent Neanderthals genome.
- Paabo produced remarkable **genetic evidence regarding interbreeding** among different sub-species of human beings in ancient times. **Example:** Findings from human skeleton showed that his/ her father was a Neanderthal and the mother a Denisovan. In another case, findings from the human skeleton showed that it was four generations subsequent to the mating between ancestors of modern humans and Neanderthal.
- **Implications for modern science:** Paabo's work establishes the genetic evolution of human beings. Modern human being's response towards infections or strength of immune system got affected due to ancient flow of genes to present day humans.
- These groundbreaking findings will help to know the composition of ancient populations in the Indian region through genome mapping of the Rakhigarhi excavation site in Haryana.

Article:

1. Svante Paabo was awarded the Nobel Prize in Medicine: Mapping Neanderthal genome.
2. Medicine Nobel goes to Swedish scientist Svante Pääbo for sequencing Neanderthal genome
3. Nobel season is here: 5 things to know about the prizes

Sharad

Light Combat Helicopter (LCH) Prachand

Source: The Hindu; The Indian Express

News: Induction of indigenously built multi-role Light Combat Helicopter (LCH), Prachand paved way for self reliance or Atmanirbharta in defence manufacturing.

History of development of LCH Prachand:

- **During Kargil war 1999**, armed forces felt the need for a dedicated platform for operating at high altitudes and delivering precision strikes.
- **In October 2006**, the government sanctioned the design and development of an India-made attack helicopter that is LCH and finally the Indian Army joined the programme in December 2013.
- Four LCH prototypes were built by HAL (**technology demonstrators or TDs**) along with rigorous flight testing with over 1,600 total flights logging 1,239 flight hours.
- These helicopter prototypes went through rigorous testing under difficult conditions for around a decade in extreme events or situations in Chennai(sea trials),Leh(extreme cold weather), Jodhpur (desert)and Siachen (high altitudes).

Timelines of testing:

- In 2010, LCH carried its first ground run after that first prototype 'TD-1' took its maiden flight to carry out low-speed, low-altitude checks on the systems.
 - In 2011, the second prototype, TD-2 after being equipped with weapons, took its first flight.
 - In November 2014, the third prototype,TD-3 made its maiden flight
 - Fourth prototype, TD-4 was tested IN 2015.
 - Outcome of testing: The LCH landed with a 500-kg weight at a forward base in the area and at a height of 4,700 metres.
- On August 26, 2017, LCH received initial operation clearance after extensive flight testing in diverse terrains and weather conditions.
 - In February 2020, LCH was declared ready for production.
 - **Defence Minister Rajnath Singh** inaugurated a new LCH production hangar at Helicopter Division of HAL with production capacity of 30 choppers.
 - In 2021, LCH was handed over to the Indian Air Force by Prime Minister Narendra Modi
 - In 2022, the Cabinet Committee on Security of the government headed by PM Modi approved the procurement of 15(10 for the IAF and 5 for the Indian Army) limited series production (LSP) variants.
 - Currently indigenous content in LSP LCH is 45%, but HAL aims to progressively increase to more

than 55%.

- On September 29, 2022 formal induction of first Light Combat Helicopter by the Indian Army.

Features of LCH:

- LCH is developed by collaborative effort of the HAL and France's Safran company.
- It is powered by twin French-origin **Shakti engines**.
- **Weight:** LCH is a 5.8-tonne class combat helicopter
- LCH has aerial combat capability along with potent ground attack.
- **Defence Ministry's description of LCH** "The helicopter possesses modern stealth characteristics, robust armour protection and formidable night attack capability. Onboard advanced navigation system, guns tailored for close combat and potent air to air missiles make the LCH especially suited for the modern battlefield,".
- **Maximum flying speed** of the LCH helicopter is 288 kmph and **combat radius** is 500 km.
- These helicopters are ideal to operate in Siachen as the service ceiling of LCH can go up to 21,000 feet.
- Although LCH inherits many features of the Advanced Light Helicopter(ALH) such as Dhruva and Rudra, but it is more sleeker than previous ALH due to nature of the tandem cockpit configuration.

Stealth features of LCH: It meets the requirements of modern warfare through

- **Reduced radar and infra-red signatures** through usage of radar-absorbing material and countermeasure dispensing system.
- Improved survivability through **crashworthy features**.
- LCH is equipped with **armoured-protection systems** and **night attack capability**.
- Pilot and co-pilot known as Weapon Systems Operator sit in tandem in a glass cockpit,
- **Weapon Systems Operators (WSO)** are protected by armoured panels from nuclear, biological and chemical (NBC) contingencies.



Image Credit: HAL

Importance of LCH Prachand:

- According to **Hindustan Aeronautics Limited (HAL)** advanced technology of Prachand can be used to destroy the enemy's air defence.
- According to the **Ministry of Defence** Light weight of Prachand ensures that it can be deployed for combat Search and Rescue, bunker busting operations, counter insurgency operations in the jungle and urban areas and support the ground forces.
- **Combat prowess of the armed forces will get a "big boost"** after induction of the LCH into the Air Force.
- LCH Prachand will provide a platform for the IAF and the Army to meet their **operational requirements**.
- **LCH helicopters can perform multidimensional roles** such as air defence and anti-tank roles in high-altitude, counter-insurgency and search and rescue operations.
- **Unique capabilities of LCH** ensures around-the-clock, all-weather combat capability due to agility, manoeuvrability, extended range and high altitude performance.
- **Check Chinese threat along the Line of Actual Control** as these helicopters along with Apache choppers will be deployed along the LAC.
- **Army aviation will gain dedicated attack helicopters in its fleet** that would augment its combat power. Current planning of the Army is to acquire 95 LCH out of which seven units(one unit composed of 10 helicopters) are to be deployed for a combat role in the mountains.
- **Customisation of this multi-role attack helicopter** for operations in desert terrains and high-altitude sectors meet the requirements of the Indian armed forces.
- **LCH can destroy air defence operations** of the enemy through firing a range of air-to-ground and air-to-air missiles.
- **Professional capability of LCH ensures quick operationalisation** as it is comparable to similar attack helicopters available around the world.
- **New chapter in defence production:** Indigenously built Light Combat Helicopter reflects India's capability in defence production. HAL is trying to achieve peak rate capacity of 30 helicopters per year to meet the requirements of defence forces.
- **Pave the way for the next phase of defence exports:** HAL has already obtained a no objection certificate from countries like Malaysia, Thailand, Vietnam, Angola, Egypt, Indonesia, Ecuador and Nigeria.

Conclusion: Earlier India used to rely on foreign-origin attack helicopters not just for its own combat operations but also for UN peacekeeping missions. Now, induction of indigenously built LCH helicopter shows the collective resolve of scientists, engineers and others who worked on it to make India strong and self-reliant in the defence sector.

Article:

1. Explained | The Indian-made LCH 'Prachand' and its significance.

2. Induction of indigenously built Light Combat Helicopter marks a new chapter: Air chief.
3. Light Combat Helicopter inducted into Indian Air Force: its features, weapons
4. Made-in-India attack helicopters inducted; special moment: PM Modi

Sharad



Nobel Prize in Chemistry

Source: The Hindu; The Indian Express

News: Chemists Carolyn R. Bertozzi and K. Barry Sharpless from the U.S. and Morten Meldal from Denmark received the Nobel Prize in chemistry for their research in click and bioorthogonal chemistry.

Complications in imitating naturally occurring compound

- Replicating reactions that involve bonds between carbon atoms is expensive and often leads to side reactions and loss of material. So, the need arises to develop synthetic strategies like click chemistry to fulfill the same purpose.
- Simpler reactions may avoid the loss of material as well as the unwanted side reactions due to strong intrinsic drive for the molecules to bond together.
- **Barry Sharpless invented the click chemistry** where instead of making carbon atoms react with each other he utilizes the smaller molecules with complete carbon frame for reactions.
- **According to The Nobel Foundation** these smaller molecules can further be linked using oxygen or nitrogen atoms as bridges.

About Click Chemistry

- Click chemistry is a branch of science invented by **Dr. K. Barry Sharpless** to explore the assembly of molecules.
- Click chemistry is a functional field where molecules snap together quickly and efficiently like a click.
- In click chemistry, molecules that wouldn't typically bind with one another are made to do so in an efficient and uncomplicated manner.
- According to Dr. Sharpless conditions for click chemistry reaction is that it should occur in the presence of oxygen and in water.
- **Dr. K. Barry Sharpless defined click chemistry as a** "set of powerful, highly reliable, and selective reactions for the rapid synthesis of useful new compounds and combinatorial libraries through heteroatom links".
- **Importance of click chemistry according to Dr. Sharpless:** Even if click chemistry fails to perfectly imitate naturally occurring compounds, it can help find molecules that fulfill the same purpose.

Timeline of Click chemistry:

- Dr. Sharpless is the originator of the concept of 'Click Chemistry' as he was the first scientist to work on click chemistry.
- Immediately, Dr. Meldal and Dr. Sharpless independent of each other presented the improved form of the azide-alkyne Huisgen cycloaddition reaction i.e. copper-catalysed azide-alkyne cycloaddition (CuAAC) reaction
- Dr. Bertozzi developed click reactions that work inside living organisms by demonstrating that these bioorthogonal reactions do not disrupt the normal chemistry of the cell.

Research of Dr. Morten Meldal

- During one of her research to find potential pharmaceutical substances. Dr.Morten Meldal and his team tried to react alkyne with an acyl halide with copper ions and palladium as catalysts
- **Analysis of the reaction:** Alkyne and the azide created a ring-shaped structure called triazole after reaction of alkyne with the “wrong” end of the acyl halide molecule.
- **Result of Dr. Meldal’s reaction:** Catalyst copper ions controlled the reaction, and acyl halide mostly remained untouched.

CuAAC reaction

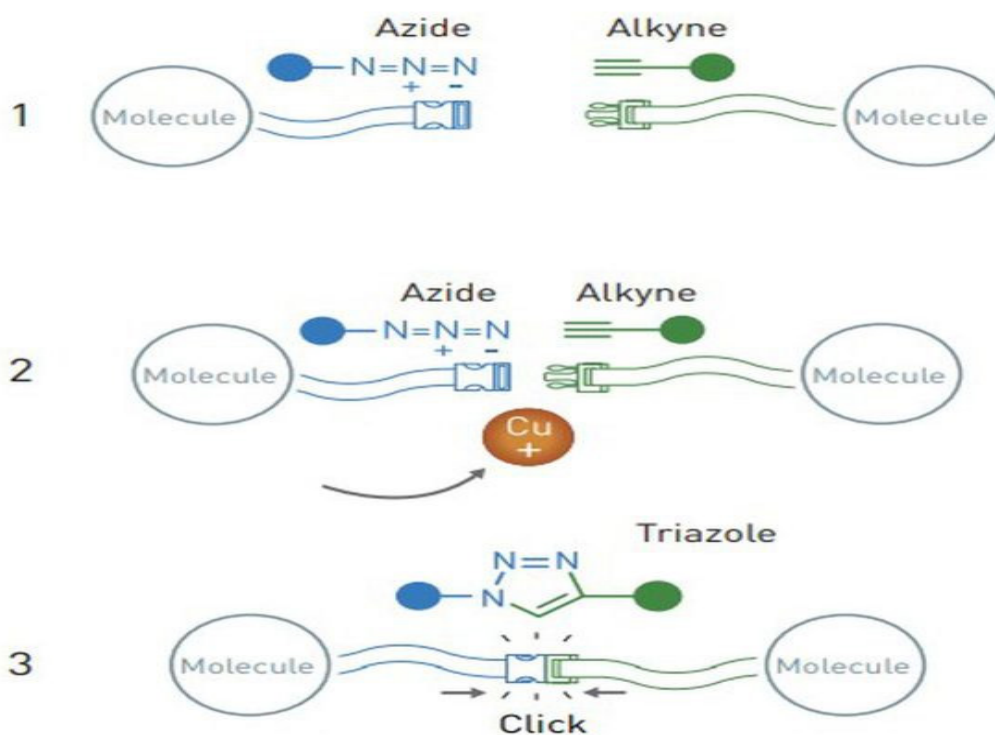


Image Credit: The Royal Swedish Academy Sciences

Contribution of Dr.K. Barry Sharpless

- In one of his research, Dr. Sharpless described the copper-catalysed reactions between azides and alkynes as an “ideal” click chemistry reaction. As the reaction worked well in water, satisfying basic criterion for click chemistry.
- Sharpless won the Nobel Prize for the second time. His first Nobel Prize was for creating Lego blocks (creating molecular building blocks) that could snap together quickly and efficiently.

Dr. Carolyn R. Bertozzi’s addition to the research

- She began her research in the early 1990s, to understand functioning of the glycan. For this she started mapping a glycan that attracts immune cells to lymph nodes.

- She tried to map the glycans using the chemical handles if cells incorporate the modified sialic acid in different glycans. So in order to do that she explores the possibility of production of sialic acid (one of the sugars that make up glycans) with a type of chemical handle.
- **Method:** Attach a fluorescent molecule to the chemical handle, and the emitted light would reveal where the glycans were in the cell. To accomplish the above reaction chemical handle should not react with any other substance in the cell. Her quest for optimal chemical handle ended with an azide.
- In 2000, Dr. Bertozzi modified the Staudinger reaction and used it to connect a fluorescent molecule to the azide introduced to glycans in cells.
- If the alkyne is forced into a ring-shaped chemical structure then azides and alkynes can react in an almost explosive manner without copper as a catalyst. This reaction worked well in cells as the strain produces enough energy for the reaction to run smoothly.
- In 2004, Dr. Bertozzi demonstrated that copper-free click reaction, called the strain-promoted alkyne-azide cycloaddition (SPAAC) can be used to track glycans.
- Bertozzi expanded click chemistry and demonstrated how it might be used in living things. She discovered a mechanism to create a copper-free (copper is poisonous to living cells) click reaction known as the strain-promoted azide-alkyne cycloaddition and showed that it might be utilised to treat tumours.

Bioorthogonal chemistry illuminates the cell

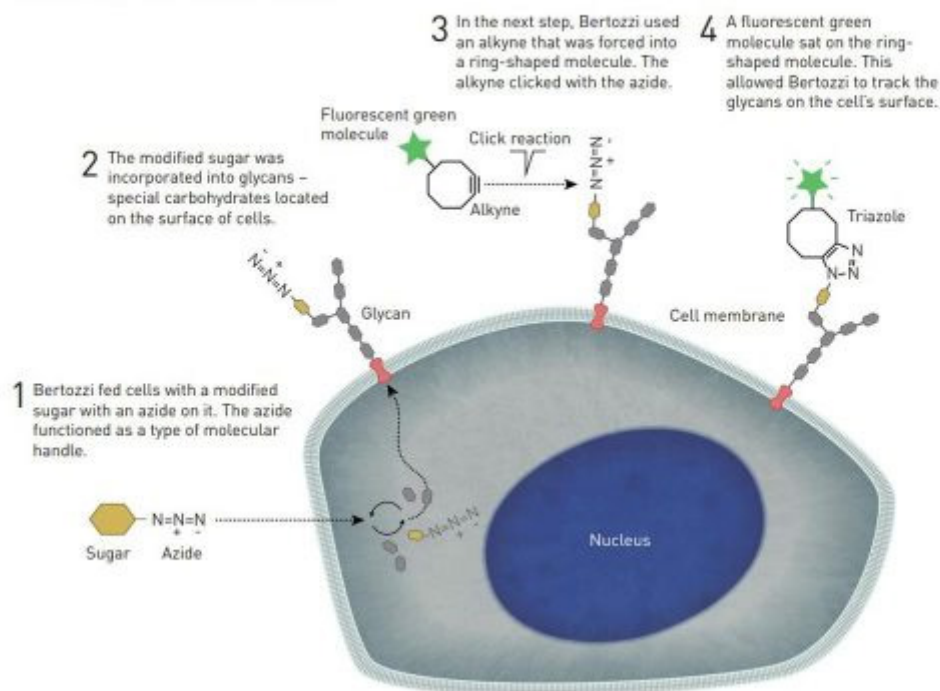


Image Credit: The Royal Swedish Academy of Sciences

Applications of Click Chemistry

- Applications in areas such as drug conjugation, materials science, etc because of high selectivity

and specificity of click chemistry reactions.

- Since bioorthogonal reactions do not interact with any other substances around them. So, they are extremely significant in medicinal biochemistry.
- **Creation of new pharmaceuticals by Dr. Bertozzi through bioorthogonal chemistry:** Through click reactions she worked on a new pharmaceutical by joining a glycan-specific antibody to enzymes that break down the glycans on the surface of the tumour cells.
- **Applications in medicinal and materials chemistry:** Research paper demonstration by John E. Moses and Adam D. Moorhouse shows that click chemistry can solve problems of purification and separation of impure products in the synthesis of dendrimers.
- Bertozzi's methods are helpful in the development of Cancer drugs as her approach has shown the promise of treating advanced cancer.

Key Chemistry Terms:

- **Alkyne:** An unsaturated hydrocarbon that has at least one triple bond between two carbon atoms.
- **Acyl halide:** A compound that has an acyl group – RCO- –bonded to a halogen.
- **Catalysts:** A substance that speeds up a chemical reaction but does not undergo any change itself.
- An azide group contains nitrogen at the opposite end.
- **Application of Triazoles:** Pharmaceutical industry, Agriculture and material science.
- **Glycans** are complex carbohydrates built from different types of sugar and are often found on the surface of proteins and cells.
- **Staudinger reaction:** A mild conversion of azide to amine.
- **Bioorthogonal reaction:** According to Dr. Bertozzi reaction between the chemical handle and the fluorescent molecule is bioorthogonal.
- **Dendrimers** are regularly-branched synthetic molecules having applications in medicinal and materials chemistry.

Article:

1. A synthetic click: On 2022 Chemistry Nobel
2. Nobel Prize 2022: Making chemistry click
3. Explained | The research in click and bioorthogonal chemistry that led to the 2022 Nobel Prize in the field.

Sharad

Nobel in Physics for quantum entanglement

Source: The Hindu; The Indian Express

News: Physicists Alain Aspect from France; John F. Clauser from the U.S. and Anton Zeilinger from Austria were selected for the 2022 Physics Nobel.

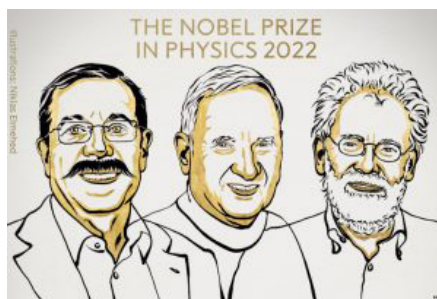


Image Credit: The Hindu

Contribution of these three physicists:

- This year's Nobel prize has been given for experimental work in quantum entanglement or in words of Einstein 'spooky action at a distance'.
- **According to the Academy of Sciences** these scientists have been awarded "for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science".
- These scientists established the fact that 'entanglement' in quantum particles are not due to any 'hidden' or unknown forces, but is real.
- **John Clauser and Alain Aspect** firmed up the concept of 'spooky action at a distance' or quantum entanglement through demonstration of more and more complex experiments. John Clauser and Alain Aspect by creating, processing and measuring Bell pairs established the fact that entanglement was indeed a true characteristic of quantum mechanics.
- **Anton Zeilinger** innovatively used entanglement and Bell pairs in quantum computation and quantum cryptography research and applications. He and his group performed quantum teleportation (In this information is conveyed from one place to another without actual transport of material) through the phenomenon of entanglement.

Quantum revolution:

- Classical mechanics is based on Newton's laws of motion. It helps to study the dynamics of a few bodies or particles interacting with each other and a system. However, classical mechanics fails to describe subatomic particles such as light quanta.
- Concepts of classical mechanics failed to visualize the movement of particles obeying quantum mechanics.
- Postulates of quantum mechanics were invoked by Max Planck, Albert Einstein, Erwin Schrodinger, Werner Heisenberg and Niels Bohr to explain problems associated with subatomic particles.

- One of the key difference between behaviour of quantum systems and classical bodies is the concept of entanglement.

Origin of the theory:

- **Quantum theory:** Quantum Theory allowed a particle to exist simultaneously at multiple locations, a phenomenon known as superposition. Once a particle was found, or observed, at one location, it ceased to exist at all other places.
- **Einstein** termed quantum entanglement as ‘spooky action at a distance’. Einstein along with Boris Podolsky and Nathan Rosen came up with Schrodinger’s cat thought experiment in 1935 where Schrodinger’s cat can be alive and dead at the same instant. This experiment challenged the foundations of quantum mechanics with the notion that there might be “hidden variables” that determine the state of the particles that are separated in space and that there is no actual quirk in quantum physics that causes them to be entangled.
- **John Bell** showed mathematically through Bell’s inequality what was required to be done to establish the phenomenon of entanglement. If Bell’s inequality is maintained in the experiment, it would mean that Einstein was right and if Bell’s inequality is violated, it would prove the predictions of Quantum Theory.
- Clauser’s entanglement experiments in 1972 clearly violated Bell’s inequality. Further, Aspect’s experiments also violated Bell’s inequality and removed all the loopholes of Clauser’s experiment.
- **Anton Zeilinger opened up new technological possibilities by exploiting entanglement property:** He ‘teleports’ the quantum states of a particle to another location without a medium or without moving the particle anywhere.
- Experiments of Clauser, Aspect and Zeilinger demonstrated that entanglement was real and in line with Quantum Theory. There are no hidden forces that drive the entanglement as suggested by Einstein.

Concept of quantum entanglement:

- Quantum entanglement allows a pair of particles, like photons, to exist in a shared state where their properties are complementary.
- Due to a quirk of quantum mechanics, two or more particles exist in an ‘entangled state’ irrespective of distance, meaning what happens to one particle affects the others immediately or behaviour in one particle instantaneously produces reaction in another.
- Due to the complementary nature of a particle’s properties, the properties of one particle tell the qualities of the other particle irrespective of distance as long as the entanglement is maintained.

Use of quantum mechanics:

- Quantum mechanical ideas have application in electronic devices such as transistors.
- Quantum properties of light are used to build the Lasers.
- Quantum technologies of the future such as quantum cryptography, and precise timekeeping in atomic clocks can be developed with the work of the three laureates.
- Quantum entanglement can be utilized in computing to make hack-free communications through

secure communications algorithms.

- It can help to actualize science fiction-like concepts of ‘teleportation’ through advancement in transformative technologies.
- **Researchers have demonstrated the entangled quantum states between photons on earth and those on a satellite:** Through optical fibres photons traversed tens of kilometres of optical fibres.
- Quantum entanglement allows for transmission of information at speeds faster than light.
- **Next generation of computers or quantum computers** can be built by exploiting entanglement properties of quantum particles to overcome insurmountable challenges.
- Quantum entanglement will help to make significant progress in the fields of quantum key distribution

Articles:

1. No longer bizarre: On 2022 Physics Nobel
2. Explained | What lies at the heart of the 2022 Physics Nobel?
3. No longer bizarre: On 2022 Physics Nobel

Sharad



Nobel Peace Prize & Nobel in Literature

Sources: The Hindu; The Indian Express

News: Norwegian Nobel Committee awarded the Nobel Peace Prize on October 7, 2022 to advocate Ales Bialiatski from Belarus for Human rights, Memorial (Russian Human rights organisation) and Center for Civil Liberties from Ukraine.

- The Norwegian Nobel Committee academy honored champions of human rights, democracy and peaceful co-existence in the neighboring countries Belarus, Russia and Ukraine.
- Last year (2021) Nobel Peace Prize was awarded to Dmitry Muratov and Maria Ressa journalists from Russia and Philippines for “their efforts to safeguard freedom of expression.



Image Credit: Indian Express

Key Contributions of Ales Bialiatski:

- In the mid-1980s, Belarus witnessed the emergence of the democracy movement. Ales Bialiatski was one of the initiators of this movement.
- Ales Bialiatski devoted his whole life for democracy promotion and peaceful development of Belarus.
- His organisation Viasna(Spring) that he founded in 1986 evolved into a broad-based organisation.
- Viasna(Spring) documented and protested against the authorities' use of torture against political prisoners.
- Since 2020, Ales Bialiatski has been detained without trial. But, despite tremendous personal hardship, Mr Bialiatski did not give up his fight for human rights and democracy in Belarus.

Key Contributions of Human rights organisation Memorial:

- Memorial was established in 1987 by human rights activists in the former Soviet Union on the notion that confronting past crimes is essential in preventing new ones.
- Memorial tries to ensure that the World should not forget the victims of the communist regime's oppression.
- Another aim of the organisation is to combat militarism and promote human rights and government based on rule of law.
- Memorial gathered verified evidence of abuses and war crimes committed against the Chechen population by Russian and pro-Russian forces during Chechen wars.
- The Academy while giving the award noted the contribution of Natalia Estemirova(Head of Memorial's

branch in Chechnya) who was killed in 2009 because of her work.

Key Contributions of the Center for Civil Liberties,Ukraine:

- Aim of the Center for Civil Liberties was strengthening democracy and human rights in Ukraine.
- It supported strengthening Ukrainian civil society and put pressure on the government to turn Ukraine into a full-fledged democracy.
- It played a pioneer role in holding guilty parties accountable for their crimes.
- Center documented Russian war crimes against the Ukrainian population during the Russian invasion in February 2022.
- After Russia's invasion of Ukraine in, the center has engaged in efforts to identify and document Russian war crimes.

Controversies surrounding Nobel Peace Prize:

- Politically contentious choice of some laureates as it often reflects the geopolitical choices of the west.
- Disagreement over word peace including the question of peace for whom.
- Universal apostle of peace i.e. Mahatma Gandhi was overlooked by the Committee.

Nobel Prize in Literature(2022):



Image Credit: The Hindu

- French author Annie Ernaux is awarded the Nobel Prize in literature.
- According to the Academy Nobel Prize in Literature(2022) is awarded to the French author Annie Ernaux "for the courage and clinical acuity with which she uncovers the roots, estrangements and collective restraints of personal memory."
- Further academy said that Ms. Ernaux believes in the liberating force of writing. Her work is uncompromising and written in plain language, scraped clean.
- Tanzanian-born UK-based writer Abdulrazak Gurnah received last year(2021)'s Nobel Prize in literature. His novels explore the impact of migration on individuals and societies.

Articles:

1.Peace, Prize, politics: On 2022 Peace Nobel

2.Nobel Peace Prize for 2022: A statement as Russia-Ukraine war rages

3.Belarus activist Ales Bialiatski, Russian and Ukrainian organisations get Nobel Peace Prize

Sharad



Snow leopard or 'ghost' cat

Source: The Hindu; The Indian Express

News: Arunachal Pradesh government is expecting the outcome of a snow leopard survey conducted in 2021 by its wildlife division in November.

Snow Leopard:

- **Native Place:** Alpine regions of Central Asia and mostly found in harsh cold climates.
- Snow Leopards survive harsh climates because of their thick fur. But, during winter months, they mostly descend to lower elevations.
- **Prey of Snow leopards:** Blue sheep, Mountain ibex and smaller prey such as hares, game birds and marmots. It has the capability to kill prey that is up to three times its own weight.
- **Habitat of Snow Leopards in India:** Higher Himalayan and trans-Himalayan landscape at an altitude between 3,000-5,400 metres.
- **Areas of Snow Leopards in India:** Jammu and Kashmir, Ladakh, Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh. Approximately, 5% of the global snow leopard range is covered by these areas.
- **Snow-leopard range countries:** Afghanistan, Bhutan, China, Mongolia, Kazakhstan, Kyrgyzstan, Nepal, Tajikistan, Pakistan, Russia and Uzbekistan.
- **International Union for the Conservation of Nature (IUCN) status of Snow Leopard:** Vulnerable.
- **Main sources of threat for snow leopards:** Climate change, Unregulated tourism, Retribution killing, Poaching, Illegal trade, infrastructure development in the mountains, and Excessive livestock grazing.
- The Government of India launched the Snow Leopard Population Assessment in India (SPAII) to estimate the population of snow leopards in the Indian range on International Leopard Day (3rd May).
- Global Snow Leopard and Ecosystem Protection Program (GSLEP) launched PAWS (Population Assessment of the World's Snow Leopards) for "robust estimate" of the snow leopard population.

Snow Leopard Population Assessment in India (SPAII):

- **Aim:** Estimate snow leopards population in Indian ranges.
- SPAII was launched during the Global Snow Leopard and Ecosystem Protection Program meeting.
- **First Step of SPAII:** Assessment of snow leopard distribution based on occupation.
- **Second Step of SPAII:** Estimation of regional density through population sampling through review of already sampled areas.
- **Tools used in SPAII:** Data sharing portal, Threat mapping and app to identify individual leopards through photographs.
- SPAII is also part of India's (Population Assessment of the World's Snow Leopards) PAWS effort.

Issues associated in counting leopard:

- Remote, high altitude range of snow leopard.
- Elusive nature of snow leopards.
- Natural population density of snow leopard is low.
- Unclear distribution of snow leopard population makes complete population census of snow leopards unfeasible.

Namdapha National Park and Tiger Reserve:

- This National Park and Tiger Reserve is located in Arunachal Pradesh's Changlang district.
- Namdapha National Park and Tiger Reserve covers an area of approx 1, 985 sq.km with lush green vegetables and virgin forests.
- Namdapha National Park and Tiger Reserve touches the international border between India and Myanmar (Burma).
- The turbulent Noa-Dihing river flows through the sprawling tropical rain forest of Namdapha National Park.
- It is located at the junction of the Indian Sub-Continent Biogeography region and the Indo-China Biogeography Region,
- Assam Forest Regulation Act of 1891 defined Namdapha as a reserved forest.
- In 1972, it was declared as a wildlife sanctuary and finally in 1983 Namdapha was upgraded to a national park and also declared as a tiger reserve.
- Namdapha is home to over 1285 faunal species, out of which 96 are mammal species, 453 are bird species, 50 are reptiles, 25 are amphibians and 76 are fish species among others.
- Namdapha is home to three large cats i.e. tiger, leopard and clouded leopard.
- There is widespread belief that the national park is also the habitat of the snow leopard.

Articles:

- 1.A quest for the 'ghost' cat: Behind Arunachal's snow leopard survey.
- 2.Namdapha National Park: 3 Royal Bengal tigers spotted by camera trapping
- 3.Explained: Why India and world are counting snow leopards, and how

Sharad

Nobel in Economic Sciences

Source: The Hindu; The Indian Express

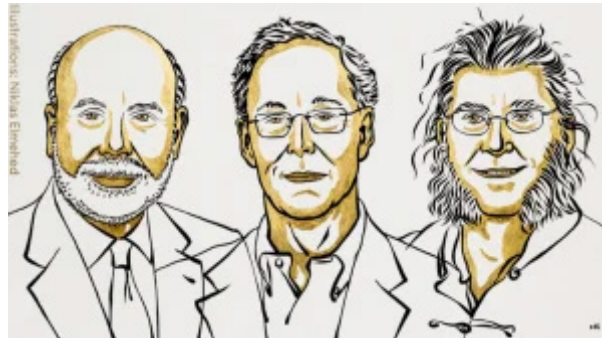


Image Credit: The Hindu

News: Ben Bernanke, Douglas Diamond and Philip Dybvig awarded the Nobel Prize 2022 for Economics ‘for research on banks and financial crises’. Royal Swedish Academy of Sciences in its statement said that this year’s Nobel laureates “have significantly improved our understanding of the role of banks in the economy, particularly during financial crises. An important finding in their research is why avoiding bank collapses is vital.”

Key Contributions of Ben Bernanke, Douglas Diamond and Philip Dybvig:

- According to Ben Bernanke failing banks accounts for the lion’s share of the economic downturn.
- Douglas Diamond and Philip Dybvig explain the reasons for bank’s existence, their role in society and the collapse of banks due to rumors.
- Solution to bank vulnerability presented by Diamond and Dybvig is deposit insurance from the government. Depositors will no longer rush to bank in case of rumours about bank run as they knew that the state has guaranteed their money.
- **Nobel laureate Douglas Diamond shows that banks perform societally important functions.** 1) Banks are intermediaries between savers and borrowers. 2) Banks can properly assess borrowers’ creditworthiness 3) Banks are in a good position to ensure that loans are used for good investments.

Ben Bernanke gave the reason for Great Depression:

- Before Bernanke, Bank Failures is seen as one of the “consequences” of the financial crisis. But Bernanke in his 1983 paper proved that bank failures were the “cause” of the financial crisis.
- His analysis of historical sources and statistical methods showed that failing banks account for the lion’s share in the drop of GDP.
- He analyzed the Great Depression of the 1930s and came to the conclusion that bank runs turned the normal recession of 1929 into a full full-fledged banking crisis by 1930 leading to the greatest economic crisis in modern history.
- His wisdom that letting banks fail often worsens a financial crisis are backed by empirical studies.

Tools provided by Bernanke in preventing bank runs:

- Recovery of the economy depends on powerful measures implemented by the state to prevent additional bank panics.
- **Provisions of deposit insurance:** where some portions of one's deposits in a bank are insured.

Analysis of Douglas Diamond and Philip Dybvig:

- Banks have lost their sheen in the public eye after the **Global Financial Crisis of 2008**. People started seeing **banks as money-grabbing institutions** that exist to borrow profit from depositors as well as borrowers. But, it would be impossible to make any long-term investment without banks.
- Papers published by Diamond and Dybvig in 1983 showed that there are "fundamental conflicts between the needs of savers and investors".
- Liquidity needs of Savers as they always wanted access to some part of their savings for unexpected use. From Banks, they expect the ability to pull out money according to their need.
- Borrowers or Investors who took out loans for building homes or roads need money for a much longer time. So, these Borrowers will face issues when money can be demanded back at a short notice.
- **Solution provided by Diamond and Dybvig to solve this mismatch:** Construction of exactly bank-like institutions. Theoretical model developed by Diamond and Dybvig explains how banks create liquidity for savers, while borrowers can access long-term financing.
- Banks through the process of maturity transformation can resolve this conflict.
- Bernanke, Dybvig and Diamond's work had laid the foundation for modern bank regulations and through this management of financial crises.

Nobel Prize in 2021 for Economics went to David Card, Joshua Angrist and Guido Imbens

- David Card's research shows how the minimum wage, immigration and education affect the labor market.
- Joshua Angrist and Guido Imbens proposed methodology to study issues that don't easily fit traditional scientific methods.

Key terms:

- **Bank Runs:** Bank runs happen when depositors rush to withdraw their savings and if a large number of people do this simultaneously, the bank's reserves cannot cover all the withdrawals, and it is driven to bankruptcy.
- **Maturity transformation:** When a bank transforms long maturity assets into bank accounts with short maturity. Bank's assets or borrowing has long maturity, as it promises borrowers that they need not to pay back their loans early. On the other hand, the bank's liabilities or deposits have short maturity as depositors can access their money as per their needs.

Articles:

- 1.Banks' role in financial crises(Udit Misra)
- 2.Economics Nobel announced: The winners' work in how banks function
- 3.Economic Sciences Nobel for trio's research on banks and financial crises

Sharad



Food day as a reminder to 'leave no one behind'

Source: The Hindu

News: COVID-19 pandemic drastically undermined the food and nutrition security. Other factors such as climate change, spiralling food inflation, conflict, and inequality are also contributing towards severe hunger.

Factors Contributing towards food and nutrition insecurity:

- **Recent Climate shocks and extreme weather phenomena** raised concerns about India's wheat and rice production over the next year.
- **Unsustainable increase in population:** India's population is projected to reach 1.5 billion people by 2030 that will put extra burden on Agri-food systems.
- **Input-intensive agriculture** leading to degradation of soil and financial insecurity among farmers.
- **Declining nutritional value of food products** due to excessive chemical use and non-judicious water use.

India's contribution towards food security:

- India has achieved self-sufficiency and improved food production.
- India exported \$49.6 billion in total agriculture exports during 2021-22, a 20% increase from 2020-21 and became one of the largest agricultural product exporters in the world.
- **Main agricultural exports of India:** Rice, sugar, and spices
- **Humanitarian food aid** to many countries such as Afghanistan.
- India ensures food aid even during food supply shortages and disruptions during the Ukraine crisis.
- India contributed toward equity in food through food safety nets that cover over a billion people.
- Public procurement and buffer stock policy of the government provided food safety nets and inclusion during the global food crisis of 2008-12 global food crisis and COVID-19 pandemic fallout.
- **Importance of Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY) scheme introduced during COVID-19:** Paper by International Monetary Fund (IMF) on 'Pandemic, Poverty, and Inequality: Evidence from India' asserted that 'extreme poverty was maintained below 1% in 2020 due to PMGKAY.

- **India as a leader in reviving millet production:** India appealed to the United Nations General Assembly to declare 2023 as the International Year of Millets.
- India renewed attention towards Millets for good nutrition, health, and the planet.

Millets:

- Millets are climate-smart crops.
- Millets are drought -resistant crops as they grow in areas with low rain and infertile soil.
- Properties of Millets: Hardier than other cereals, more resilient to climate change, less water requirement for cultivation (70% less than rice), requires less energy to process (around 40% less than wheat).
- Millets can revive soil health as they need fewer inputs and are less extractive for the soil.
- India contributes around 41% of world's total millet production in 2020.

Initiatives of Government of India:

- **Paramparagat Krishi Vikas Yojana (PKVY)** for promotion of organic farming.
- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)** for improved water use through focus on more crops per drop.
- **Soil Health Management** through Integrated Nutrient Management under the National Mission for Sustainable Agriculture.
- **Programmes for improving food access to vulnerable populations:** Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY), the Pradhan Mantri Poshan Shakti Nirman Yojana (PM POSHAN Scheme), and take-home rations.
- **National Food Security Act (NFSA), 2013** that led to Targeted Public Distribution System (TPDS).
- **PM POSHAN scheme** that was earlier known as the Mid-Day Meals scheme.
- **State and National governments along with the UN World Food Programme (WFP)** ensure efficiency and try to improve these programmes through digitisation and rice fortification, better health, and sanitation measures.
- National government is implementing a **Sub-Mission on Nutri-Cereals (Millets)** as part of the National Food Security Mission to enhance the area, production, and productivity of millets.

Way Ahead:

- **Climate adaptation and resilience building.**
- **Better production through promotion of sustainable practices** in the areas of crops, livestock, fisheries, food security, and management of natural resources.
- **Inclusive, effective, and sustainable agri-food systems** through organic farming or Zero Budget Natural Farming etc.
- **Strengthen food security nets** to ensure access to essential nutrition for millions and promote livelihood for vulnerable communities.
- **Revive indigenous crops** such as millets for food and nutrition security through State-level missions.
- **More focus on climate smart or drought resistant crops.**
- **Preservation of agrobiodiversity** by ensuring genetic diversity in crops.
- **Incentivize investments and fair remuneration to producers** of climate smart crops for inclusive and equitable food systems.
- **Promotion of millet and agricultural biodiversity** on various multilateral fora such as G20.
- **Strengthening Millet value chains in India** for enhancing nutritional benefits and increasing farmers' incomes.
- **Strengthening transparency in the agricultural system** through promoting labelling, traceability, etc.

Conclusion: Food and nutrition security contributes towards collective peace and prosperity. India should lead the global discourse on food and nutrition security through the principle of leaving no one behind and home-grown solutions and best practices. It should work to make its food system more equitable, empowering, and inclusive.

Prelims Fact:

- Tejaswini Programme was launched by MP government with participation from International Fund for Agricultural Development (IFAD's)
- Data from the programme showed that growing millets led to nearly 10 times increase in income from ₹1,800 per month in 2013-14 to ₹16,277 in 2020-21.
- Millets were easier to grow and led to better outcomes. So, Women were key to villages adopting millets.

Article: The Hindu: Food day as a reminder to ‘leave no one behind’(Konda Reddy Chavva,Ulac Demirag,Bishow Parajuli)

Sharad



Editorial: The bigger picture of intermediation, financial crises

Source: The Hindu

News: Nobel Prize in Economics for the year 2022 offers a deeper understanding of the genesis, the propagation, and the management of financial crises.

Role Played by banks in modern economies:

- Banks are the cornerstone of the financial system.
- Mobilize savings for investments.
- Create opportunities to pool risks.
- Improve allocative efficiencies.
- Banks Lower transaction costs between borrowers and lenders.

Risk associated with Banks:

- Banks are vulnerable to small shocks and market sentiments that may trigger a financial crisis or bank run.
- Rise in Non-Performing Assets may lead to severe economic consequences.
- **Risk associated with maturity transformation** where the bank has to turn short-term deposits into long-term lending.
- Bank Run due to mismatch of assets (loans) and liabilities (deposits) of banks.
- Small rumors of bank run could trigger belief among the depositors that their deposits are at risk and may trigger a financial crisis

Article: The bigger picture of intermediation, financial crises (Niloy Bose and Sudipta Sarangi)

Sharad

Editorial: Securing India's cyberspace

Source: The Indian Express

News: Indian Army has collaborated with industry and academia for development of cryptographic techniques for secure communications and cryptography applications.

Risks faced by India's cyberspace:

- **Chinese quantum advances:** India's digital infrastructure is facing a barrage of quantum cyberattacks from Chinese state-sponsored hackers. Indian cyberspace is facing additional vulnerability due to dependence on Chinese hardware.
- **Vulnerability of existing or traditional digital infrastructure models:** Current quantum cyber attacks can breach any hardened target protocols due to inefficiencies of RSA protocols.
- **Gap between India and advanced nations in quantum computing accentuated the cross border cyber risks.** Example: China hosts two of the world's fastest quantum computers and the U.S.A has allocated \$1.2 billion for defence-related quantum technology research.
- **Inadequacy capability to withstand quantum cyberattacks:** As India does not have potential to develop advanced systems.

Researches and Investments for securing India's cyberspace:

- Defence Research and Development Organisation (DRDO) and IIT-Delhi team demonstrated Quantum key distribution (QKD) link between Prayagraj and Vindhyachal.
- Quantum technology is now "mission of national importance".
- National Mission on Quantum Technologies and Applications launched in the Union Budget 2020-21 with a budget outlay of Rs 8,000 crore.

Way forward:

- Deployment of **"quantum-resistant" systems** through upgradation of current encryption standards.
- Investments in **Hack proofing** cyber or quantum systems.
- Transition to **quantum-resistant algorithms** by India either through development of new algorithms for their cypher suite or through procurement of Suite B Cryptography Quantum-Resistant Suite as its official encryption mechanism.
- **Technical steps** to handle quantum computer attacks by emulating a series of encryption tools developed by the US's National Institute of Standards and Technology (NIST).
- National initiatives to develop quantum-resistant systems through open-source projects related to post-quantum cryptography.
- India should enthusiastically participate in the **Open Quantum Safe project**.
- Implementation and development of quantum-resistant communications capabilities in **critical strategic**

sectors.

- Priority should be given to **secure sensitive military communications** or to protect key intelligence from potential quantum cyberattacks.
- Protection of cyberspace from cross-border quantum cyber offensive by establishing nationwide communication networks integrated with quantum cryptographic systems.
- Diplomatic partnerships with “**techno-democracies**” to pool resources for mitigating emerging quantum cyber threats.

Conclusion: Focus on post-quantum cybersecurity

- As applications of quantum physics in strategic domains are becoming reality. India needs a holistic approach to tackle increasing cybersecurity challenges or risks.

Key terms

- **Open Quantum Safe project:** It is a global initiative for prototyping and integrating quantum-resistant cryptographic algorithms started in 2016.
- “**Techno-democracies**” as defined by Arjun Gargeyas and Sameer Patil are countries with top technology sectors, advanced economies, and a commitment to liberal democracy.

Article: Securing India’s cyberspace(Arjun Gargeyas;Sameer Patil)

Sharad



India's first hydrogen fuel cell bus

Source: The Indian Express; PIB

News: Recently Union minister of state for Science and Technology Jitendra Singh unveiled a hydrogen fuel cell bus developed by KPIT-CSIR in Pune.



Image credit: PIB

Overview of hydrogen fuel cell technology:

- **According to the US Department of Energy**, the working mechanism of fuel cells is similar to conventional batteries found in electric vehicles.
- Fuel cells need not to be recharged with electricity as they do not run out of charge.
- As long as the supply of hydrogen is maintained fuel cells continue to produce electricity.
- **Similarity between fuel cells and conventional cells:** Fuel cells also consist of an anode (negative electrode) and cathode (positive electrode) sandwiched around an electrolyte similar to conventional cells.
- **Working Mechanism of fuel cells:** The anode is supplied with hydrogen, while the cathode is fed with air. The hydrogen molecules are split into protons and electrons at the anode by a catalyst, and both subatomic particles travel in separate directions to the cathode. Electric motors can be powered by the flow of electricity produced when the electrons pass through an external circuit. On the other hand, the protons move to cathode through the electrolyte. Once there, they combine with electrons and oxygen to produce heat and water.

- Battery-powered electric vehicles or Hydrogen fuel cell-powered vehicles produce emissions, but no tailpipe emissions.

Advantages of hydrogen fuel cell-powered vehicle:

- Hydrogen fuel cell electric vehicles **produce no tailpipe emissions**, unlike conventional vehicles with internal combustion engines (ICE) that produce direct emissions through the tailpipe.
- **Most environment friendly mode of transportation:** Hydrogen fuel cell-powered vehicles emit only water vapour and warm air. So, Fuel Cell vehicles have zero greenhouse gas emissions.
- **Efficiency** of hydrogen fuel cell-powered vehicles is **greater** than internal combustion engine vehicles.
- **Refueling time of Hydrogen fuel cell electric vehicles is as fast as an internal combustion engine.** Hence, making it more practical than battery-powered electric vehicles for public transportation purposes. Battery-powered electric buses take hours to charge, but hydrogen can be refilled in a matter of minutes in fuel cell vehicles.
- **Low operational costs of fuel cell trucks and buses** due to high energy density of hydrogen and high efficiency of fuel cell vehicles: Rupees per kilometre operational costs for fuel cell trucks and buses are lower than diesel powered vehicles.
- It can **eliminate on-road decentralised emissions** from diesel powered heavy commercial vehicles.
- It can **bring a freight revolution in India** along with inland waterways for freight and passenger transport.
- This technology will help **India to become a net exporter of clean hydrogen energy** from a net importer of fossil energy.
- **India can become a leader in hydrogen space** by becoming a large green hydrogen producer and supplier of equipment for green hydrogen.

Conclusion or Way forward: Sustainable production of hydrogen

- Currently the biggest source of hydrogen in the world is fossil fuels leading to a large number of emissions with their usage. So, in future collaborative effort is required between all the stakeholders to move towards renewable methods such as solar and wind energy for generating hydrogen just like we moved towards renewable sources of electricity.

Article:

1. India's first hydrogen fuel cell bus: What is hydrogen fuel cell technology, how will work?
2. PIB: Union Minister Dr Jitendra Singh unveils India's first truly indigenously developed Hydrogen Fuel Cell Bus developed by KPIT-CSIR in Pune; Says, the launch is in tune with PM Modi's National Green Hydrogen Mission

Sharad



Non-polluting tech in auto sector

Source: The Indian Express

News: Government data shows that electronic vehicles (EVs) adoption has seen a considerable rise since 2020. As per the data shared by the Minister of State for Heavy Industries Krishan Pal Gurjar with Parliament, 1.19 lakh EVs were sold in 2020, which increased to 3.11 lakh in 2021 and 4.19 lakh in 2022.

EV categories:

- **n Plug-in hybrid vehicles or PHEVs:** PHEV uses an IC engine in combination with an electric motor backed by rechargeable batteries. Electric motor is used for power and rechargeable batteries can be plugged into a power source.
- **n Fuel cell electric vehicles or FCEVs:** Combination of hydrogen and oxygen used to produce electricity for running the motor. FCEVs range and refuelling processes are comparable to conventional cars and trucks. But they are considered as Evs. **Examples:** Toyota's Mirai, Honda's Clarity and Hyundai's Nexo.
- **n Conventional hybrid electric vehicles or HEVs:** HEV is hybrid vehicle drive-train due to combination of conventional internal combustion engine system and an electric propulsion system. HEVs substantially lowers fuel usage. Unlike PHEVs, HEVs do not have a plug-in option. When the IC engine is powering the drive-train or by regenerative braking the onboard battery in a conventional hybrid is charged. Examples: Toyota Hyryder/ Maruti Grand Vitara models, Toyota Camry and Honda City e.
- **Flex fuel Vehicles:** Vehicles that can run on one or multiple fuel types. Example: Toyota sedan.
- **Examples of other hybrid models:** Honda City e, Toyota Urban Cruiser Hyryder, Maruti Suzuki Grand Vitara, Toyota Innova Hycross.
- **Battery Electric Vehicles (BEVs):** Tata Nexon EV, the Hyundai Kona or Mahindra eVerito.
- Recently Union minister of state for Science and Technology Jitendra Singh unveiled a hydrogen fuel cell bus developed by KPIT-CSIR in Pune.

Reasons for rise in the number of EVs and multiple hybrid platforms

- Sharp **rise** in prices of petroleum products.
- **Reduction** of Goods and Service Tax (GST) on EVs from 12 to 5 per cent.
- **Production Linked Incentive (PLI) scheme** for manufacturing of Advance

Chemistry Cell (ACC) to replace costly Lithium-based batteries.

- Central government asked states to waive road tax for EVs.
- Government is also mulling proposals for a **broader taxation incentive structure** for other clean technologies in the auto sector.
- **Constant efforts by Prime Minister Narendra Modi to reduce carbon intensity** of the Indian economy and proceed towards **net zero emission**. PM Modi in his address at the 26th United Nations Climate Change Conference (COP26) in Glasgow, said that India aims to reduce the carbon intensity of its economy to less than 45 per cent by 2030 and net zero emission by 2070.
- **Recent government policies** aim to shift the auto industry from Internal Combustion Engine (ICE) systems to multiple tech platforms apart from battery electric vehicles like conventional hybrids, flex fuels, fuel cells and even hydrogen ICE etc.
- **Faster Adoption and Manufacturing of Electric and Hybrid Vehicles in India (FAME)** programme of Ministry of Heavy Industries provides benefits to electric and hybrid Vehicles including Fuel cell vehicles.

Demands for EVs are rising still there are lot of problems faced by policy makers to push new non-polluting auto tech or platforms in the mass market:

- **Behavioural issues:** Despite so much push for EVs only 10 lakh EVs were sold in the country in the last four years against 6.3 crore non-electric vehicles as people become accustomed to petrol or diesel vehicles.
- **Logistic Challenges:** Due to unavailability of battery charging points and lithium ion batteries.
- **High Cost of EVs compared to non-electric vehicles** due to usage of lithium-ion battery that is the costliest component in the EV.
- **Issues in the existing auto taxation structure:** that offers incentives based on the type of powertrain instead of lower emissions or higher mileage to auto companies.
- **Excessive focus of the government on battery electric vehicles** neglecting other technologies like conventional hybrids, flex fuels, fuel cells and even hydrogen Internal Combustion Engine(ICE).
- **Divisions within the auto industry:** Auto companies without hybrid portfolios are opposing the proposal for lower tax on conventional hybrid vehicles.
- **Current taxation structure discourages hybrid vehicles:** Effective taxation on hybrid vehicles is 43 percent just 2 percentage points lower than the 45 percent levied on mid-sized passenger Internal Combustion Engine (ICE) vehicles.

- **High GST rate of hybrid passenger vehicles:** Battery Electric Vehicles (BEVs) are taxed at 5 percent GST rate, but GST rate is 28 percent on all passenger vehicles.
- Government policies are not able to keep pace with changing technology due to bureaucratic taxation structure.

Article:

1. India sees a rise in EV adoption since 2020: Govt data
2. Govt eyes tax breaks for more non-polluting tech in auto sector

Sharad



Goal of India's G20 Presidency is to tackle Climate Change

Source: The Indian Express

News: Emission of Greenhouse gas is a major global concern and it requires a coordinated approach to tackle it.

Greenhouse gases (GHG):

- After emission GHG remains in the atmosphere for a long time, while other pollutant gases have a relatively shorter life span.
- Major constituents of GHG i.e. carbon dioxide remain in the atmosphere for as long as a thousand years.
- **Distance traveled by GHG is far greater than other pollutant gases:** Carbon dioxide can travel up to thousands of kilometres while pollutant gases like sulphur dioxide at best travel up to a few hundred kilometres.
- **Greenhouse gases also impact far away climate from the source:** Excessive sulphur dioxide emissions cause acid rain (rainwater containing sulphuric acid) in areas near the emitting source, carbon dioxide impacts far away places.
- The 19th century Industrial Revolution and global Industrialisation exacerbated the volumes of GHG in the atmosphere.

Steps taken to address greenhouse gases induced climate change:

- Countries under the United Nations Framework Convention on Climate Change (UNFCCC) framework started International climate change negotiations in 1994.

Issues while addressing climate change:

- Reluctance on part of developed countries to help developing countries to help them adapt to and mitigate climate change. Despite the fact that developed countries owe debt to developing countries.
- Accounting issues associated with climate fund transfers: Many developed countries are trying to obfuscate the need for financial transfers.
- Ineffectiveness of International climate change negotiations as everybody wants to shed its responsibility.
- Poor and developing countries in Africa, South Asia and Latin America are disproportionately bearing the consequences of extreme climatic conditions like excessive hot weather, untimely and excessive rains, flooding.
- Developed countries are not honoring their own commitments and still hold devel-

oping countries responsible for emission inflows.

Way forward:

- Along with containing inflows of new GHG emissions, focus should be on reducing the already existing huge stock.
- **Principle of “common but differentiated responsibilities and respective capabilities”** : Developed countries who are major carbon emitters should bear the major burden of carbon emissions, they should provide funds to developing countries and facilitate technology transfers to address climate change.
- Climate change is known as the tragedy of the commons. So, every stakeholder should perform their allocated role honestly and with integrity.
- India should commit less in international forums on climate change negotiations, retain the domestic policy space, and deliver more than committed.

India and Climate Change:

- India hosts 30 percent of the world's cattle population, 2.4 percent of the world's surface area, 4 percent of the water resources and 55 percent of its energy needs are met by coal.
- India has shown its leadership position when it voluntarily declared ambitious NDCs in Paris followed by bold commitments in COPs.

Conclusion: India should put pressure on developed countries during the COP meetings on climate change or in other forums like G-20 to make developed countries pay for climate change.

Sharad

International Migration Outlook Report 2022

Source: The Indian Express

About International Migration Outlook 2022 Report

- Released by Organisation for Economic Co-operation and Development (OECD)
- It provides an overview of trends in international migration flows and policies up until 2021.
- Report puts a spotlight on origin countries and destination countries of students who signed up for academic degrees in OECD countries or developed countries.

Key findings of the report:

- **Largest share of foreign students in OECD countries are from China (22%) and India (10%)** since about a third of the world's population aged 20-29 live in China and India.
- According to the report Indian and Chinese students display “remarkably different” behaviours when it comes to staying on in their host countries by extending their study visas or by obtaining work permits.
- Compared to Chinese students, Indian students are likely to stay back on extended permits with highest chances of holding a work permit five years into their stay.
- Report shows different retention behaviours among Indian and Chinese students, **Indian students have higher stay rate than the overall international student population** while Chinese students have more diverse retention behaviour and overall larger shares of students from China leave after their education.
- Data of the stay rates of Indians and Chinese students shows that Indians have significantly higher retention rates than the Chinese in nearly every OECD country including Canada, Germany, Australia, New Zealand, the United Kingdom and Japan.
- **Indians have a faster transition rate from student visas to work permits than the Chinese.** Bulk of Indian students accounted for the direct transitions from a study permit to a temporary high-skilled permit (H-1B) in the United States. In Canada among the students admitted in 2015, compared to 18 percent Chinese 71 percent Indians held a work permit by 2020,
- Most of the enrollment of Indian students are at the masters or PhD level while students from China are enrolled at UG level. This explains the Indian students' “quicker transition to the labour market and shorter period on an education permit”.

Conclusion: Trend captured by the OECD report shows “brain drain” from India. In recent years, the Centre is trying to reverse the trend of brain drain. Now, the Government is keen on converting “brain drain” into “brain gain” or retaining talent at home.

Article: Indian students abroad most likely to stay back in developed countries: Report

Sharad



Living Planet Report 2022

Source: The Indian Express

News: Report shows that biodiversity populations shrink to 69% in nearly 5 decades.

About Living Planet Report

- Report is flagship World Wildlife Fund (WWF).
- This is a biennial report that is published after every 2 years.
- Report is a comprehensive study of trends in global biodiversity and the health of the planet.
- Living Planet Report 2022 reveals an average decline of 69% in species populations since 1970.
- Along with conservation efforts urgent actions are required to reverse nature loss.
- It also measures species response to environmental pressure due to loss of biodiversity and climate change.

Key findings of Living Planet Report 2022:

- Addition of just over 11,000 new populations after tracking 32,000 species populations of 5,230 species, with 838 species.
- Percentage of monitored wildlife populations (mammals, birds, amphibians, reptiles and fish) dropped by 69 percent between 1970 and 2018.
- India has seen a decline in honeybees and 17 species of freshwater turtles population in between 1970 and 2018 period.
- Most vulnerable regions in the country in terms of biodiversity losses are Himalayan region and Western Ghats.
- Expectations of the future biodiversity loss with increase in temperature.
- Significant increase in the number of fish species (481).
- Largest decline of monitored wildlife populations is seen in Latin America and the Caribbean regions. Average decline of 94% is seen in Latin America and the Caribbean regions between 1970 and 2018.
- Monitored populations in Africa and Asia Pacific plummeted by 66% and 55% respectively.
- Most decline is seen in freshwater populations with an average 83% decline between 1970 and 2018.
- According to threat perception Cycads (an ancient group of seed plants) are the most threatened species, while decline in corals are the fastest, followed by amphibians.
- Main drivers of decline in wildlife population: Loss of habitat and degradation and exploitation of land, introduction of invasive species, pollution, climate change and disease.
- Biggest threat to nature is Land Use Change i.e. destruction or fragmentation of natural habitats of many plant and animal species on land, in freshwater and in the sea.
- Climate Change may emerge as the dominant cause of biodiversity loss if nations are unable to limit warming to 1.5°C.
- Every degree of warming is expected to increase mass mortality events, as well as the first extinction of an entire species and will negatively impact people.

- Around 50% of warm water corals have already become extinct. Further, 1.5 degrees Celsius warming may lead to loss of 70-90% of warm water corals. Due to sea level rise Bramble Cay melomys (small Australian rodent) became extinct after sea-level rise.
- Continued deforestation of mangroves through aquaculture, agriculture and coastal development at annual rate of 0.13%.
- Degradation of mangrove is due to overexploitation and pollution along with natural stressors such as storms and coastal erosion. Myanmar remains hotspots of mangrove loss.
- Migration of fish is threatened as only 37% of rivers that are over 1,000 km long remain in their natural state.
- Most prevalent threats to amphibians (animals that live both on land and in water) are agriculture and for birds and mammals hunting and trapping remains the most prominent threats.
- The Southeast Asia region is facing a significant level of threat. Impact probabilities for climate change are highest in Polar regions and the east coast of Australia and South Africa driven particularly by impact on birds.

Initiatives to promote conservation of species

- Recent project of Cheetah translocation that will create an umbrella effect for preservation or conservation of other species.
- Success of projects such as Project Tiger or One-horned rhino and lions.

Article: Shrinking biodiversity: 69% drop in wildlife populations in nearly 5 decades, shows report

Sharad



World Economic Outlook Report 2022

Source: The Indian Express

News: Red flags for India after publish of IMF's latest world economy report.

About World Economic Outlook Report

- Report is published by the International Monetary Fund.
- The IMF publishes two World Economic Outlook (WEO) reports (in April and October) and two updates (January and July) every year.
- The World Economic Outlook Report warned the policymakers around the globe: "The worst is yet to come" for the world economy.
- Report highlights the toughest economic policy challenge that is persistent high inflation and stalling growth.
- Global economy continues to face steep challenges due to various scenarios around the world.

Reasons for steep challenges faced by global economy:

- Russian invasion of Ukraine.
- Cost-of-living crisis caused by persistent and broadening inflation pressures.
- Slowdown in China.
- Partially healed post-pandemic economic wounds got opened by this Overall, this year's economic shocks.

Four sources of threat to India that will worsen the government's financial health:

- Higher crude oil and fertiliser prices that will spike domestic inflation.
- Global slowdown hurting exports, dragging down domestic growth and worsening the trade deficit.
- Strong dollar puts pressure on the rupee's exchange rate that may reduce India's forex reserves and capacity to import goods.
- Low Indian economic demand forcing the government to spend more towards basic relief such as food and fertiliser subsidies.

Key findings from the report:

- This year or next year more than a third of the global economy will contract.
- Growth of three largest economies i.e the United States, the European Union and China will continue to stall.
- Immediate threat to current and future prosperity is “increasing price pressures as it will squeeze real incomes and undermine macroeconomic stability.
- Highlighted the policy makers’s dilemma: Generally, inflation containment drags down growth while policy measures to boost growth tend to spike inflation.
- WEO’s Economic Counsellor Pierre-Olivier Gourinchas stated that: “As storm clouds gather, policymakers need to keep a steady hand.”
- Growth Outlook: Current IMF’s growth forecast is the weakest growth profile for the world since 2001 barring the global financial crisis of 2008 and the sharp fall immediately after the Covid pandemic in 2020. IMF has drastically reduced its projection for global growth, from 6.0% in 2021 to 3.2% in 2022 and 2.7% in 2023.
- Current predictions of peak global inflation in late 2022 is 9.5%. The inflation is anticipated to stay high for longer than previously imagined and is projected to drop to 4.1% by 2024.
- Worrying trajectory of core inflation: Rise and fall in core inflation are more gradual than inflation in food and fuel.
- IMF statement on global core inflation is expected to be 6.6 per cent on a fourth-quarter-over-fourth-quarter basis.
- Current global core inflation reflects the pass-through of energy prices, supply chain cost pressure, and tight labour markets especially in advanced economies.
- Core inflation will take more time to go away as food and fuel price inflation has spiked headline inflation that has now entered into core inflation.

Downside Risks in IMF projections:

- Policy miscalibration: As there is massive uncertainty about the future and most economies are facing precarious situations.
- Chances of fiscal and monetary policies running against each other: When this happens there is high chances of mini-financial collapse. Example: Current mini-financial collapse in the UK is due to expansionary fiscal policy by Liz Truss government when Bank of England was trying to contain high inflation by raising interest rates.
- Other mistakes can also happen even in case of aligned fiscal and monetary policies:

Over-tightening of monetary policy risks stalling down growth while under-tightening risks inflation.

- Worry about financial stability's interplay with a stronger US dollar: Sharp revision of interest rates will likely expose the weakest links in the global credit chain.
- Geopolitical risks due to the Ukraine war: Prolonged conflict in Ukraine can make the economic pressures worse.

IMF Projections meaning for India:

- India appears to be better placed than others at first glance as GDP growth rate of India is better and without high inflation.
- But these metrics hide the fact that India is barely out of the contraction suffered in 2020 and World Bank data shows that India was home to the most people pushed below abject poverty in 2020 or are unemployed.
- India's growth in 2022-23 will be 5.8 per cent if RBI cuts its growth rate forecast in April (7.2 percent) by the same measure as IMF has (1.4 percent points).

Key concepts or terms:

- **Stagflation:** Stagflation is an economic state where growth stalls or contracts even in case of high and persistent inflation.
- **Core inflation:** Inflation rate without prices of food and fuel or Inflation measured by excluding food and energy prices.
- **Expansionary fiscal policy:** Tax cuts and unfunded hikes in expenditures by the government.
- Over-tightening of monetary policy stance by policymakers meaning raising interest rates more than required.

Article: IMF's latest world economy report: Red flags for India

Sharad

Ancient Water Management System

Source: The Hindu

News: Kings in Indian history developed the water management system of the highest order. Visnu and Vasistha's Dharma Shastras as well as Chanakya's Arthashastra also consist of instructions on water management.

Contribution of Chola in water management:

- **Creation of great anicut of Kallanai (Tamil Nadu) and** this oldest water regulatory structures and a heritage irrigation structure created by **Karikala Chola**. Waters of the Cauvery reach the fields through multiple channels of great/grand anicut.
- **Raja Raja Chola I was also credited for construction of Brihadisvara temple (Thanjavur district, Tamil Nadu).**
- **Cholas considered the work of water and flood management as a pious duty.**
- **Chola Myth: Lord Shiva descended to strengthen flood banks after an old woman prayed to him.**

Raja Raja Chola's water governance model: Raja Raja Chola I was micro manager, an ambitious planner and an executor-par-excellence.

- Raja Raja Chola I built the still functional **Uyyakondan** channel (985-1013 AD) and over 5,000 dams and set up a water ministry.
- **Focus on water conservation and rainwater harvesting:** Thousands of ancient tanks serving communities in his kingdom.
- **Planning and the management of water through proper rules:** Tanks were built keeping in mind topography of the Deccan plateau.
- **Neerkatti in-charge of irrigation for every village** supplied water from these tanks to the fields by following a schedule.
- **Discussion, planning and management of water resources** for judicious use at village council.
- **Parakesarivarman inscriptions also** mention the punishment for unauthorised withdrawal of water.
- At that time the minimum parameter for utilisation of water is 2.5 times the capacity of the tank, which is still followed by the Government of India.

Other Contributions of Raja Raja Chola(Uttaramerur inscriptions):

- Contribution towards democratic governance: Uttaramerur inscriptions in Tamil Nadu show the prevalence of the panchayat system during the Chola empire.
- Every village was categorized as Kudumbu or present day ward. General Assembly consists of one representative from these kudumbus.
- Right to recall available to people in case a candidate/representative failed to declare details of his property.
- During the reign of Chola kings decision making autonomy was guaranteed to village councils about their villages and the kingdom audited those decisions.
- Stable Kingdom as Kingdom operated around the fulcrum of the king and his central cabinet: Great Chola king unified the land under him by converting landlords into dependent government servants.

Recent Government initiatives based on Raja Raja Chola I's model

- Mahatma Gandhi National Rural Employment Guarantee Act(MGNREGA): MGNREGA is based on Raja Raja Chola I's model of cost equivalent to labour for various works of irrigation and water management.
- Jal Shakti Abhiyan followed the cooperation model between government and people followed during the Raja Raja Chola I for water conservation.

Other examples of water conservation practices:

- Kempegowda founded Bengaluru based on his mother's advice 'Keregalam Kattu, and Marangalam Nedu (Build lakes, plant trees)' that 's why Bengaluru is known as 'the Garden City'.
- Eri Varyam was a separate body for lake management under Pallavas' reign.
- Embankments of Lake Sudarshana were repaired by the King Rudradaman of Junagadh, Gujarat, when it was destroyed in a cloud burst.
- Rani Ki Vav (or the queen's stepwell) in Gujarat that quenches the thirst of millions is built by queen Udayamati in memory of King Bhimdev represents love.

Conclusion: Our great ancestors' Kingdom is based on empathy that makes them truly great. Teachings of the past can be used to build technologies of the future.

Article: Ancient stewardship now stamped on the present(Gajendra Singh Shekhawat)

Sharad

New varieties of Basmati rice seeds

Source: The Hindu

News: New five paddy seeds developed by IARI in 2020 and 2021 can resist diseases and herbicides.

Initially, out of five, three varieties can resist two common fungal and bacterial diseases of paddy while in the case of the other two seeds Direct Sowing of Rice (DSR) method is used to raise them that saves 35% of water.

- **Qualities of Basmati rice:** It is known for its mouthfeel, aroma and length of the grain.
- Seven states are major Basmati Rice producing states that is Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Uttar Pradesh and Uttarakhand.
- These states want a Geographical Indication tag for Basmati Rice.
- Major diseases affecting traditional varieties are bacterial leaf blight (BLB) and blast (leaf and collar) diseases caused by the fungus *Magnaporthe oryzae*.
- High levels of pesticides and fungicides used to tackle these diseases increased the permitted residue levels required in developed countries.
- **Market of Basmati rice:** India exports 75% of its Basmati rice to West Asian countries. India also imports Basmati rice to European Union countries.

Process use to develop these varieties:

First step: Mutation breeding through Ethyl Methanesulfonate (EMS) chemical. This chemical helps to identify plant variants that survive herbicide application.

Release of non-genetically modified herbicide-tolerant seed to farmers on an experimental basis.

Submission of application to the Central Insecticide Board's registration committee for expansion of label claim to this variety.

Recent trials prove effective weed control, excellent cooking quality and absence of herbicides.

Impact of this development

- Landmark achievement as this revolution is 100% indigenous that used indigenous

breeding programmes.

- Major impact is an increase in farmers' income through reduction in cost of cultivation or farming by ₹3,000 per acre.
- It will improve production by realising the price of labour and input cost.
- It will reduce the use of pesticides and water as farmers need not use pesticides.
- Better prices of production in case production is free from residue.
- Efficient control of weeds: as these seeds are resistant to disease and herbicides. All Pusa Basmati varieties consist of four genes, two to resist BLB and two to resist blast disease.
- Enhanced Export: Huge abroad Basmati market currently brings about ₹30,000 crore foreign exchange every year. New development has potential to further enhance the value of export.
- Decrease in pesticide residue levels will help India to export Basmati rice to the European Union(EU) as there is no pesticide residue.Hence,no rejection of Indian consignments.
- Increase in production through effective disease control.
- Application of direct sowing of rice (DSR) increases water saving by 35% and hence reduction in greenhouse gas emission.

Article: Five new varieties to expand India's Basmati platter

Sharad

Express Editorial: Weaving a safety net

Source: The Indian Express

News: Reports published in Indian Express raises issues of labour violations and exploitation of Indian workers in the Gulf countries.

Migrant issues in Gulf countries:

- Violation of labour rights in destination countries, especially in Gulf countries.
- Vulnerabilities of low-skill migrant workers doing jobs at Dubai Expo, the construction of stadiums for the Qatar world cup and the Covid pandemic.
- Lack of access to healthcare services and the absence of health service firewalls for undocumented migrants in Gulf Cooperation Council (GCC) countries created panic during Covid-19.
- Issue of wage theft in the GCC-South Asia region: Return Migration Survey conducted among 2,000 Vande Bharat returnees revealed the extent of job loss, non-payment of wages, reduction in wages, contract violations and intimidation of workers.
- Concerns over the rights violations and deaths of migrant workers during construction of stadiums for the football World Cup in Qatar.
- GCC countries's aim to reform the Kafala system is merely symbolic as these countries simultaneously started implementing nationalisation policies, which may lead to forceful job termination.
- Country of origin reacts to large-scale violation of labour rights only when an issue is reported.
- Little impact on existing MoUs with GCC countries on domestic workers' recruitment and prevention of irregular recruitment.
- Governments failed to develop a collective conscience on global labour mobility.
- Lethargy of Indian government towards migrant welfare: Indian government's migrant welfare efforts are limited only to "repatriation exercises" during the crisis.

Initiatives to address migrant issues:

- "Madad" portal by the government that can be used by migrant workers from the country to file their grievances. Madad portal resolves around 95 percent of the registered grievances.
- Abu Dhabi Dialogue process for cooperation between Asian countries that are the

origin of and destination for labour.

Way forward:

- Joint efforts by civil society, trade unions, recruitment agents and governments to prevent large-scale violation of labour rights.
- India as a key player in the South Asia-GCC migration corridor should serve as a role model for South Asia to address grievances of migrant workers.
- Pass draft Emigration Bill of 2021 (originally drafted in 2019) as soon as possible to address issues of low -skilled migrant workers.
- Joint effort between countries of destination and origin to address the migrants issues in situations like the pandemic and migrant deaths.
- Build regional alliances in the South Asia-GCC corridor to address the issues faced by South Asian migrants.
- Abolish Kafala and other anti-labour laws of Gulf countries to make the GCC region as migrant-labour friendly.

Sharad



First private bio-energy plant in Punjab

Source: The Hindu

News: Punjab is witnessing the beginnings of a renewable energy revolution rooted in agriculture as the first private bio-energy plant commenced its commercial operation. Plant aims to convert agricultural waste into wealth through production of Compressed BioGas (CBG) from paddy straw.

Common practice among Punjab, Haryana and western Uttar Pradesh farmers:

- Farmers prepare fields for the next crop by burning paddy stubble and biomass in the field.
- The resultant clouds of smoke after paddy burning engulf the entire National Capital Territory of Delhi and neighboring States between October to December.
- **Outcome:** Negative environmental effects on human and livestock health.
- Current situation is that crop residue burning is spreading to the rest of the country and even among rabi crops.

Measures taken to tackle stubble burning:

- **Commission for Air Quality Management in the National Capital Region and Adjoining Areas (CAQM) framework:** CAQM had developed an action plan for the effective prevention and control of stubble burning.
- **In-situ management:** In this heavily subsidized machinery is used to incorporate paddy straw and stubble in the soil.
- The Ministry of Agriculture and Farmers Welfare started the Crop residue management (CRM) Scheme.
- **Ex-situ CRM efforts:** (a) Utilization of paddy straw for biomass power projects and co-firing in thermal power plants (b) feedstock for 2G ethanol plants (c) feed stock in CBG plants (d) fuel in industrial boilers (e) waste-to-energy (WTE) plants (f) in packaging materials, etc.
- **Additional measures:** Monitor and enforce stubble burning ban and awareness generation campaigns.

New Study and its finding:

- NITI Aayog and FAO India explored methods to convert paddy straw and stubble into energy.
- Study aims to complement the in-situ programme through possible ex-situ uses of rice straw.
- FAO's report calls for development of crop residue supply chain in Punjab for collection, storage and final use of rice straw for production of renewable energy and other services.
- **Result of the study:** Investment of ₹2,201 crore (\$309 million) needed to collect, transport and store it within a 20-day period to mobilise 30% of the rice straw produced in Punjab. This would not only reduce greenhouse gas (GHG) emissions by about 9.7 million tonnes of CO₂ equivalent and around 66,000 tonnes of PM_{2.5}, but also improve the earning potential of farmers.

Outcome of techno-economic assessment of energy technologies:

- Cost-effective nature of rice straw for producing CBG and pellets. Pellets can be used as a substitute of coal in thermal power plants. CBG can be used as a transport fuel.
- Rice straw production in Punjab i.e. 30% of total straw production will help in achieving the 5% CBG production target set by the Government of India scheme, "Sustainable Alternative Towards Affordable Transportation (SATAT)".
- New energy technologies can also increase local entrepreneurship, increase farmers' income and reduce open burning of rice straw.

Other benefits associated with new energy technologies:

- **Replenish soil with organic matter:** As slurry or fermented organic manure from the plant (CBG) will be used as compost.
- Reduce dependence on chemical fertilizers.
- Creation of a large value chain from paddy harvest, collection, baling, transport and handling of biomass due to installation of CBG plant will provide additional employment opportunities to rural youth.
- Initiative can change the face of the rural economy across the country due to value addition to the economy, farmers' income and sustainability through environmen-

tal benefits, renewable energy.

Way forward: Focus on 'wealth from waste' approach and circular economy.

Article: A renewable energy revolution, rooted in agriculture (Ramesh Chand, Konda Reddy Chavva)

Sharad



ISRO's heaviest rocket launches 36 satellites.

Source: The Hindu

News: Recently, ISRO's heaviest rocket Launch Vehicle Mark 3 (LVM3 or GSLV Mark 3) placed 36 satellites in low earth orbit.

About OneWeb:

- U.K. government and India's Bharti Enterprises launched OneWeb as a joint venture.
- OneWeb partnered with NSIL and ISRO to fulfill its commitment to provide connectivity across the length and breadth of India by 2023 from Ladakh to Kanyakumari and Gujarat to Arunachal Pradesh.
- Launch Vehicle Mark 3 (LVM3 or GSLV Mark 3) successfully orbited 36 satellites of the U.K.-based OneWeb in its 14th launch, bringing the constellation to 462 satellites.
- Currently, OneWeb's connectivity solutions live in regions north of 50-degrees latitude. After this launch, OneWeb is just four satellites away to provide global satellite coverage in 2023.
- **Benefits associated with OneWeb:** Secured satellite solutions to enterprises, towns, villages, municipalities and schools, including the hardest-to-reach areas across the country.

Features of LVM3-M2 mission:

- LVM3-M2 is the dedicated commercial satellite mission.
- It is part of NewSpace India Limited (NSIL), a Central Public Sector Enterprise (CPSE) under the Department of Space, Government of India.
- LVM3-M2 mission is part of the commercial arrangement between NSIL and m/s Network Access Associates Limited (m/s OneWeb Ltd).
- ISRO's statement said that in a historic mission all the satellites got separated successfully in a slow process and the mission happened exactly as planned in the shortest possible time. ISRO is planning to place another 36 satellites in the next M3 mission.
- Purpose of LVM3 was to launch geo-stationary satellites with payload capacity of

4T and launching 6T payloads for LEO.

- In the LVM3 mission C25 stage was handled through in-house built inertial navigation systems.

Impact of the mission: New chapter for India in the space sector.

- LVM3 mission is a great opportunity for ISRO to meet the requirements of launch vehicles.
- **High foreign direct investment in the country:** As LVM3 mission launch opens up the space sector in India for billion dollars foreign investment.
- Less execution time of mission illustrated the opportunities for satellite connectivity in India.
- Mission utilizes LEO connectivity potential to deliver broadband services across India.
- LVM3 mission exemplifies **Atmanirbharta** and enhances India's **competitive edge** in the global commercial launch service market.

Article:

ISRO's heaviest rocket successfully places 36 satellites in orbit

Sharad

From Lodha to Ramana: the Chief Justices of the Modi era

- From Lodha to Ramana: the Chief Justices of the Modi era
- **The Supreme Court (SC)** of India known as the custodian of the Indian Constitution.
- **Primary responsibility of the SC: To ensure protection of fundamental rights of citizens guaranteed under the Constitution from the state.**

Supreme Court emerges as the most powerful court among other courts of the world due to:

- Its power of judicial review through its decision in Keshavananda Bharati case.
- It assumed the power of judicial appointments to itself and High Courts through various judgements in first judge, second judge and third judge cases and CJI is appointed through seniority convention.
- SC of India ensures the citizens wide ranging protections by expanding scope of the fundamental right to life and liberty guaranteed under Article 21 of the Constitution.
- **Provision of Public interest litigation(PIL)** through which common citizens approach the courts even by sending a letter.
- **Powerful Chief Justice of India (CJI):** Besides performing normal judicial duties. CJI is responsible for selecting judges for appointment to the higher judiciary and deciding the number and composition of benches to adjudicate on different kinds of cases.

Evolution of the office of CJI: It is a classic example of a constant shifting and re-balancing of power between the judiciary and the executive.

- **From 1950 to 1971:** During this period CJI had complete authority over judicial appointments, and CJI can even veto any judicial appointments.
- **Between 1971 and 1993:** Executive became strong due to strong single party central governments and executive started appointing 'committed judges' to the Supreme Court, in a clear attempt to change the size of Supreme Court in its favor. SC in 'first judges' case (1981) or SP Gupta case held that the opinion of the Chief Justice of India would not be binding on the government.
- **In the second judge's case (1993)** creation of Judicial primacy and the collegium took place. Through the second judge case of 1993 the judiciary seized the power of appointments back from the executive.
- **After 2014:** Due to the rise of the Narendra Modi-led BJP government single party

majority the executive is once again back in control and as a consequence of it the power of the judiciary is weaker than before and weak judiciary is unable to control autocratic tendencies of the executive such as communal polarisation, misuse of investigating agencies and slow destruction of democratic institutions etc.

CJIs of the Modi era (2014 – 2022):

- Just after ending the tenure as CJI, Justice P. Sathasivam was appointed as Governor of Kerala without an appropriate cooling period against the own policy of BJP govt. After the NJAC judgment, matters were still not settled, and the memorandum of procedure for appointments to the higher judiciary became the centrepiece of the dispute between the executive and the judiciary
- Tenure of Justice R.M. Lodha: He revived the dormant trend of direct appointments from Bar to the Bench in the Supreme Court. This practice was permitted under the Constitution, but rarely attempted. Justice Lodha was also famous for report on reforms in the Board of Control for Cricket in India. The Executive under the Modi government first confronted the judiciary when it refused the appointment of Gopal Subramaniam as judge of SC.
- Tenure of Justice H.L. Dattu: His tenure was known for the first major confrontation between the executive and the judiciary. Judiciary struck down the National Judicial Appointments Commission (NJAC) Act. But, Supreme Court failed to fix the flaws in the NJAC Act, by addressing its shortcomings. Memorandum of procedure for appointments to the higher judiciary remains the centerpiece of the dispute between the executive and the judiciary.
- Justice T.S. Thakur: He highlighted the plight of the overburdened Indian judiciary and worked actively for mechanisms of filling up vacancies. He was responsible for setting up the National Judicial Data Grid to connect all levels of the judicial system and to provide easy information to litigants. He fell in conflict with Modi government when he attempted about 20 transfers of judges across High Courts. Due to ambiguous nature of the decision and since it is threatening independence and overall integrity of the judiciary, he had to reverse his decision.
- Justice J.S. Khehar: Many landmark judgments such as Right to Privacy and Triple Talaq were passed during his short tenure. He also revived the debates on the lack of transparency and fairness in managing the roster in the Supreme Court. His response towards procedure followed by him when allegations were made against him in a suicide note of Kalikho Pul (former Arunachal Pradesh CM) was without precedent and also without propriety. In a complete disregard of basic principles of natural justice and clear case of conflict of interest, Justice Khehar chose to list the letter written by Pul's wife seeking permission to file an FIR against the judges mentioned in the as a writ petition (converting an administrative question into a judicial one). In his tenure High Court judge, Justice C.S. Karnan, was convicted and

imprisoned for contempt of court but some experts felt that decision was unconstitutional as it overlooked Parliament's exclusive privilege to remove a member of the higher judiciary in an act.

- Justice Dipak Misra: During his tenure four fellow judges held an unprecedented press conference condemning the CJI's internal administrative decisions, specifically related to disregard for court conventions of bench strength and bench composition in the allocation of cases. Impeachment motion was also proceeded against him in parliament which was eventually quashed by the Rajya Sabha. Issue of the master of roster and conflict of interest also emerged during his tenure. Justice Misra tried to achieve a balance between adjudication and disposal and known for setting up the maximum number of constitutional benches as CJI.
- Justice Ranjan Gogoi: He had been party to the unprecedented press conference held by judges. But during his tenure he disregarded the conflict of interest when he sat in the hearing of a sexual harassment complaint made by an employee of the Supreme Court against himself breaking all principles of natural justice. He was obsessed with secrecy, and preferred information to be submitted to the court in 'sealed covers' and this was employed in Assam's National Register of Citizens (NRC) matter, the Rafale dispute, the electoral bonds issue. His tenure gave rise of the 'executive court' when judiciary took over the executive's role in NRC. He refused to admit habeas corpus petitions filed from Jammu & Kashmir in the wake of the abrogation of Article 370. He gave rise to the practice of 'judicial evasion' as Supreme Court avoided hearing certain cases altogether such as the electoral bonds case, the Citizenship Amendment Act case, the abrogation of Article 370, etc. He also accepted an appointment as a Member of Parliament (Rajya Sabha) soon after retirement which he opposed during his judicial tenure. Also there is increased interference of executive and legislative in the matters of the judiciary. Also the tendency towards sycophancy started among Supreme Court judges, some judges like Justice Arun Mishra and Justice M.R. Shah publicly praised the PM. His Bench also concluded the long-standing Ayodhya dispute.
- Justice Sharad A. Bobde: He has the longest tenure in the Modi era. Judiciary experimented boldly with technology, but it also shows greater subservience towards the government. Judicial evasion continued in his tenure. In his period the Court gave preferential treatment to certain matters, for example, in the bail matters of journalists Siddique Kappan versus Arnab Goswami. He stayed the farm laws and set up a committee to examine the law that seems to be biased in favor of law. He discouraged the use of Article 32 petitions as a means of approaching the court. He tried to take away the right to adjudicate on COVID cases from High Courts. Supreme Court's attitude towards plight of migrant laborers in India during the pandemic was blight. In his tenure there was a case of stand off within the collegium when Justice Bobde was reluctant to recommend Justice Akil Kureshi to the Supreme Court which was recommended by Justice Nariman.

- Justice N.V. Ramana: He started the judiciary's engagement with the public through his speeches and brought back some of the old glory of the Supreme Court. He once again revived the 'sentinel on the qui vive' of the Judicial institution. He improved the public confidence in the judiciary through certain bail orders and stays (e.g., sedition), and the Pegasus inquiry. But some judgments from his associate judges during his tenure seriously undermined civil liberties. Court's decision on the Prevention of Money Laundering Act, Unlawful Activities (Prevention) Act (the Watali case), had the effect of virtually detaining people for an indefinite period. The Supreme Court was held responsible for criminalizing petitioners who dared to approach the Court on civil liberty matters for example, The Teesta Setalvad/Zakia Jafri and Himanshu Kumar cases. To improve the diversity in the system he appointed many women judges and made a significantly large number of appointments in the higher judiciary to fill all the vacancies of the SC. But, despite efforts to improve the image of the judiciary, the practice of judicial evasion continued and no constitutional Benches were formed in Justice Ramana's term. Current CJI of SC is U.U. Lalit: He improved processes of filing and listing of cases. He initiated certain orders such as granting bail to individuals in the Kappan and Setalvad cases.

Future Challenges and responsibilities of SC/Judiciary:

Protect the judiciary from powerful executives.

Strengthening the Indian judiciary, especially the lower courts.

Evolving the office of the CJI in the right direction.

Source: The Hindu: From Lodha to Ramana: the Chief Justices of the Modi era (A.P. Shah)



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