



SC on Death Penalty

For Prelims: Important Cases Related to Death Penalty, Provisions for Death Penalty, Article 21.

For Mains: Judiciary, Government Policies & Interventions, Issues Arising Out of Design & Implementation of Policies, Death penalty and Arguments Related to It.

Why in News?

Recently, the [Supreme Court \(SC\)](#) commuted the death sentence of a man, convicted of the rape and murder of a seven-year-old girl, to life imprisonment.

- The judgment may **become a significant precedent to the anti-[death penalty](#) cause.**

What was SC's Ruling in the Current Case?

- SC commuted the death sentence to life imprisonment, with the rider that **he shall not be entitled to "premature release or remission** before undergoing actual imprisonment" for a period of 30 years.
- SC advised the trial judges that they **should not be swayed in favour of death penalty** merely because of the dreadful nature of the crime and its harmful impact on the society. They should **equally consider the mitigating factors in favour of life imprisonment.**
- **SC** referred to the **evolution of the principles of penology** and said that penology had grown to accommodate the philosophy of "preservation of human life".
 - **Penology** is a **sub-component of criminology that deals with the philosophy and practice of various societies** in their attempts to repress criminal activities, and satisfy public opinion via an appropriate treatment regime for persons convicted of criminal offences.
- SC noted that that **though capital punishment serves as a deterrent and a "response to the society's call for appropriate punishment in appropriate cases",**
 - The **principles of penology have "evolved to balance the other obligations of the society, i.e., of preserving the human life, be it of accused, unless termination thereof is inevitable and is to serve the other societal causes and collective conscience of society".**

What is a Death Penalty?

- Capital punishment, also called the death penalty, **is the execution of an offender sentenced to death after conviction by a court of law of a criminal offence.** It is the highest penalty awardable to an accused. Generally, it is awarded in extremely severe cases of murder, rapes, treason etc.
- The death penalty is **seen as the most suitable punishment and effective deterrent for the worst crimes.** Those who oppose it, however, see it as inhumane. Thus, the morality of the death penalty is debatable and many criminologists and socialists all across the globe, have been long demanding abolition of the death penalty.

What are the Arguments in Favour of the Death Penalty?

- **Retribution:** One of the key principles of retribution is that **people should get what they deserve** in proportion to the severity of their crime.
 - This argument states that real justice requires people to suffer for their wrongdoing and to suffer in a way appropriate for the crime.
- **Deterrence:** Capital punishment is often justified with the argument that by executing convicted murderers, we **will deter would-be murderers from killing people**.
 - It is often argued that the **death penalty provides closure for victims' families**.

What are the Arguments Against the Death Penalty?

- **Deterrence Ineffective:** The **statistical evidence doesn't confirm that deterrence works**. Some **of those executed may not have been capable of being deterred** because of mental illness or defect.
 - Death has been prescribed in rape cases since 2013 (Sec. 376A of IPC), still, rapes continue to happen and in fact, the brutality of rapes has increased manifold. This compels one to think of the death penalty is an effective deterrent to crime.
- **Execution of the Innocent:** The most common argument against capital punishment is that sooner or later, **innocent people may get killed, because of mistakes** or flaws in the justice system.
 - According to Amnesty International: As long as human justice remains fallible, the risk of **executing the innocent can never be eliminated**.
 - Death has been **abolished as a form of punishment in most of the developed countries**.
- **No Rehabilitation:** Capital punishment doesn't rehabilitate the prisoner and return them to society.

What is the Status of Death Penalty in the Indian Context?

- Prior to the [Criminal Procedure \(Amendment\) Act \(Cr PC\) of 1955](#), **the death penalty was the rule and life imprisonment an exception in India**.
 - Further, the courts were bound to give an explanation for awarding a lighter penalty than death for capital offences.
- After the amendment of 1955 **courts were at liberty to grant either death or life imprisonment**.
 - **As per Section 354 (3) of the Cr PC, 1973** the courts are required to state reasons in writing for awarding the maximum penalty.
 - The **situation has been reversed and a life sentence is the rule and death penalty an exception** in capital offences.
 - Moreover, despite a global moratorium against the death penalty by the **United Nation, India retains the death penalty**.
 - India is of view that **allowing criminals guilty of having committed intentional, cold-blooded, deliberate and brutal murders to escape with a lesser punishment will deprive the law of its effectiveness** and result in travesty of justice.
- In concurrence of this, a proposal for the **scrapping of the death penalty was rejected by the Law Commission** in its 35th report 1967.
- In India as per official statistics, **720 executions have taken place in India after it became independent in the year 1947**, which is a minuscule fraction of the people who were awarded death penalty by the trial courts.
 - In the majority of the cases, death was commuted to life imprisonment and some were acquitted by the higher courts.

What are the SC's Previous Rulings on on the Death Penalty?

- **Jagmohan Singh v. State of UP 1973 case:** SC held that according to [Article 21](#) deprivation of life is constitutionally permissible if that is done according to the **procedure established by law**.
 - Thus the death sentence imposed after a trial in accordance with legally established procedures under Cr.PC and the **Indian Evidence Act 1872** is not unconstitutional under Article 21.

- **Rajendra Prasad v. State of UP 1979 case:** SC held that, if the murderous operation of a criminal jeopardizes social security in a persistent, planned and perilous fashion then his enjoyment of fundamental rights may be rightly annihilated.
- **Bachan Singh v. the State of Punjab 1980 case:** SC propounded the dictum of '**rarest of rare cases**' according to which death penalty is not to be awarded except in the 'rarest of rare cases' when the alternative option is unquestionably foreclosed.
 - Rarest of Rare Cases can be described:
 - When the murder is committed in an extremely brutal, ridiculous, diabolical, revolting, or reprehensible manner so as to awaken intense and extreme indignation of the community.
 - When total depravity and cruelty are the motives behind a murder.
- **Machhi Singh v. State of Punjab 1983 case:** The Supreme Court laid down certain considerations for determining whether a case falls under the category of rarest of rare cases or not.

What should be the Way Forward in Such Cases?

- Instead of merely enhancing punishment, **tackling crimes against women and children requires broader social reforms**, sustained governance efforts and strengthening investigative and reporting mechanisms.

[Source: TH](#)

Role and Power of Governor

For Prelims: Constitutional Provisions Related to Governor

For Mains: Friction Points in Governor-State Relations, Article 356, Administrative Reforms Commission (1968), Rajamannar Committee (1971) and Justice V.Chelliah Commission (2002).

Why in News?

The Governor acts in '**Dual Capacity**' as the **Constitutional head of the state and as the representative of the Union government.**

- In recent years, the **bitterness between states and Governors** has been largely about the **selection of the party to form a government, deadline for proving majority, sitting on Bills, and passing negative remarks on the state administration.**
- Due to this, Governor is referred to with negative terms like an **agent of the Centre, Puppet and rubber stamps.**

What are Constitutional Provisions Related to the Governor?

- **Article 153** says that there shall be a Governor for each State. **One person can be appointed as Governor for two or more States.**
 - A Governor is appointed by the President and is a nominee of the Central Government.
- It is stated that the **Governor has a dual role.**
 - He is the **constitutional head of the state**, bound by the advice of his **Council of Ministers (CoM).**
 - He functions as a **vital link between the Union Government and the State**

Government.

- **Articles 157 and 158** specify eligibility requirements for the post of governor.
- Governor has the power to **grant [pardons](#), reprieves, etc. (Article 161)**.
- There is a CoM with the CM at the head to aid and advise the Governor in the exercise of his functions, **except some conditions for discretion. (Article 163)**
- The Governor appoints the Chief Minister and other Ministers **(Article 164)**.
- Governor assents, withholds **assent, or reserves the bill for the consideration** of the President passed by the Legislative Assembly **(Article 200)**.
- Governors may promulgate the **Ordinances** under certain circumstances **(Article 213)**.

What are the Friction Points in Governor-State Relations?

- Governor is envisaged as an **apolitical head** who must act on the advice of the council of ministers. However, the **Governor enjoys certain discretionary powers granted under the Constitution**. For example,
 - Giving or **withholding assent** to a Bill passed by the state legislature,
 - **Determining the time** needed for a party to prove its majority, or
 - Which party must be called first to do so, **generally after a hung verdict in an election**.
- There are **no provisions** laid down for the manner in which the Governor and the state must engage publicly when there is a **difference of opinion**.
- The Governor has a 5-year tenure, he can remain in office only until the **pleasure of the President**.
 - In 2001, the **National Commission to Review the Working of the Constitution**, held that the Governor owes his appointment and his continuation to the Union.
 - There is the apprehension that he is likely to act in accordance with the instructions received from the Union Council of Ministers.
- In the Constitution, there are **no guidelines for exercise of the Governor's powers**, including for appointing a CM or dissolving the Assembly.
- There is **no limit** set for how long a Governor can withhold assent to a Bill.
- The Governor sends a report to the centre which forms the basis of the Union cabinet's recommendations to the President for invoking **[Article 356 \(President's Rule\)](#)**.

What Reforms have been Suggested?

- **On Appointment and Removal of Governor:**
 - The "**Punchhi commission - 2010**" recommended that there should be a provision for the impeachment of the governor by the state legislature.
 - The state chief minister should have a say in the governor's appointment.
- **On the Use of Article 356:**
 - The "**Punchhi commission - 2010**" recommended that Articles 355 & 356 be amended.
 - The **Sarkaria Commission (1988)** recommended that Article 356 should be used in very rare cases when it becomes unavoidable to restore the breakdown of constitutional machinery in the State.
 - **[Recommendations](#)** have also been given by the **Administrative Reforms Commission (1968)**, **Rajamannar Committee (1971)** and **Justice V.Chelliah Commission (2002)**.
- **On Dismissal of State Government under Article 356:**
 - **S.R. Bommai Judgment (1994)**: The case put an end to the arbitrary dismissal of State governments by a hostile Central government.
 - The verdict ruled that the floor of the Assembly is the only forum that should test the majority of the government of the day, and not the subjective opinion of the Governor.
- **On Discretionary Powers:**
 - The Supreme Court in the **Nabam Rebia judgment (2016)** ruled that the exercise of Governor's discretion Article 163 is limited and his choice of action should not be arbitrary or fanciful.

Way Forward

- **Strengthening of Federalism:** In order to check misuse of the office of governor, there is a need to strengthen federal setup in India.
 - In this regard, the Inter-State council and the role of Rajya Sabha as the chamber of federalism must be strengthened.
- **Reform the Method of Appointment of Governor:** The appointment can be made from a panel prepared by the state legislature and actual appointing authority should be the Inter-state Council, not the central government.
- **Code of Conduct for Governor:** This 'Code of Conduct' should lay down certain 'norms and principles' which should guide the exercise of the governor's 'discretion' and his powers which he is entitled to use and exercise on his judgement.

[Source: IE](#)

India- Srilanka Bilateral Meeting

For Prelims: Unitary Digital Identity framework, Aadhaar, Sri Lanka's economic crisis, East Coast Terminal project., Currency Swap, Line of Credit, Neighbourhood First policy.

For Mains: Effect of Policies & Politics of Countries on India's Interests, India and its Neighbourhood, India-Sri Lanka Relations and Way Forward.

Why in News?

Recently, in a bilateral meeting **India has agreed to provide a grant to Sri Lanka to implement a 'Unitary Digital Identity framework'**, apparently **modelled on the [Aadhaar card](#)**.

- Both sides also discussed the fishermen's issue and India provided financial assistance of **2.4 billion USD to Sri Lanka**.
- Earlier, India and Sri Lanka agreed to a **[four-pronged approach](#)** to discuss initiatives on food and energy security to help mitigate **[Sri Lanka's economic crisis](#)**.

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What is the Unitary Digital Identity framework?

▪ About:

- It is **similar to India's own Aadhaar** and under the proposed Unitary Digital Identity framework, Sri Lanka is **expected to introduce a:**
 - Personal identity **verification device based on biometric data**
 - **Digital tool** that can represent the identities of individuals in cyberspace and
 - **Identification of individual identities** that can be accurately verified in digital and physical environments by combining the two devices

▪ Previous Attempts:

- This is not the first time that Sri Lanka is attempting to digitise its citizens' identities. Just a few years ago from 2015 to 2019, the Sri Lankan government mooted a similar **Electronic-National Identity Card — or E-NIC** —that privacy advocates opposed on grounds that the state would have full access to citizens' personal data in a central database.
- Government also **tried initiating the project as early as 2011**. Neither project was implemented.

What is the Recent Economic Support that India is Providing to Sri Lanka?

- Beginning January 2022, **India has been providing crucial economic support** to the island nation in the grip of a [severe dollar crisis](#) that, many fear, might lead to a sovereign default, and a severe shortage of essentials in the **import-reliant country**.
- The relief extended by India from the beginning of this year totals over USD 1.4 billion —a USD 400 [currency swap](#), a USD 500 loan deferment and a USD 500 [Line of Credit](#) for fuel imports.
- Sri Lanka is **further negotiating a USD 1 billion assistance from India to help** the country as it faces an unprecedented economic crisis.

What was India's Stand on Bilateral Relations?

- Expediently **take forward mutually beneficial projects**", which include:
 - Proposals to enhance air and sea connectivity between India and Sri Lanka
 - Economic and investment initiative
 - Steps to enhance Sri Lanka's energy security
 - Keeping the neighbours' **"shared maritime domain safe from various contemporary threats"**, and cooperation in combating [Covid-19 pandemic](#).

What are Some Major Issues in India-Sri Lanka Relations?

- **Killing of Fisherman:**
 - Killing of Indian fishermen by the Sri Lankan Navy is a lingering issue between these two nations.
 - In 2019 and 2020, a total of 284 [Indian fishermen were arrested](#) and a total of 53 Indian boats were confiscated by the Sri Lankan authorities.
 - In the current meeting both the countries **discussed the Palk Bay fisheries conflict and reiterated the longstanding consensus** to handle fishermen issues through **“humanitarian approach and refrain from the use of violence”**.
- **East Coast Terminal project:**
 - This year (2021) Sri Lanka cancelled an MoU signed with India and Japan for the [East Coast Terminal project](#).
 - India protested the cancellation though it later agreed to the West Coast Terminal being developed by the Adani group.
- **Influence of China:**
 - China’s rapidly growing economic footprint (and political clout as a corollary) in Sri Lanka is straining India-Sri Lanka relations.
 - China is already the largest investor in Sri Lanka, accounting for 23.6% of the total [Foreign Direct Investment \(FDI\)](#) during 2010-2019 as against 10.4% from India.
 - China is also one of the largest export destinations for Sri Lankan goods and holds over 10% of its external debt.
- **13th Amendment of the Sri Lankan Constitution:**
 - It envisages devolution of necessary powers to the provincial councils to address the just demand of the Tamil people for equality, justice, peace, and respect within a united Sri Lanka.

What should be the Way Forward for India?

- A subterranean trust deficit exists between India and Sri Lanka yet **neither Sri Lanka nor India can afford to have strained ties**.
- However, as a much larger country, **the onus is on India to carry Sri Lanka along**. India needs to be extremely patient and avoid reacting to any pinpricks and engage Sri Lanka even more regularly and closely, especially at the highest levels.
- There is a **need to step up our people-centric developmental activities** while scrupulously staying clear of any interference in Colombo’s domestic affairs.
- Nurturing the [Neighbourhood First policy](#) with Sri Lanka is important for India to preserve its strategic interests in the Indian Ocean region.

[Source: TH](#)

SAMRIDH Initiative

For Prelims: SAMRIDH Initiative, Atal Innovation Mission (AIM), NITI Aayog, Covid-19.

For Mains: Significance of SAMRIDH initiative in improving Healthcare Landscape.

Why in News?

[Atal Innovation Mission \(AIM\)](#), [NITI Aayog](#), and the **US Agency for International Development (USAID)** announced a new partnership under the **Sustainable Access to Markets and Resources for Innovative Delivery of Healthcare (SAMRIDH) initiative**.

- The collaboration will focus on **innovations across the healthcare landscape with the common goal to mount an effective response** to the ongoing third wave of **Covid-19** and build health system preparedness for future infectious disease outbreaks and health emergencies.
- The **Planning Commission was replaced by a new Think Tank - NITI Aayog on 1st January, 2015** with emphasis on **'Bottom -Up' approach** to envisage the vision of **Maximum Governance, Minimum Government**, echoing the spirit of **'Cooperative Federalism'**.
- **AIM** is a flagship initiative set up by the NITI Aayog to **promote a culture of innovation and entrepreneurship** in the country.

What is the SAMRIDH Initiative?

▪ About:

- In 2020 the Indian government, academia, and the private sector developed the **innovative SAMRIDH blended finance facility** to combine **public and philanthropic funds with commercial capital** to create and rapidly scale market-based health solutions.
 - **Blended finance** is an approach towards financing where catalytic funding (e.g grants and concessional capital) from public and philanthropic sources is utilized to mobilize additional private sector investment to realize social goals and outcomes.
- It will improve **access to affordable and quality healthcare for vulnerable** populations in tier-2 and tier-3 cities, and rural and tribal regions.
- This initiative is implemented **by a Technical Support Unit** managed by **IPE Global (a company)**.

▪ Objectives:

- **Bridge supply-side gaps in healthcare facilities** to respond to health emergencies in the immediate, medium, and long term.
- Accelerate scale-up and **adoption of innovative and market-based health solutions**.
- **Mobilize resources** to support high impact health solutions and build sustainable healthcare systems.
- **Promote local and comprehensive solutions** at the community and facility level for vulnerable populations.

▪ Significance:

- AIM and SAMRIDH will **leverage philanthropic capital, and public sector resources to offset barriers for commercial investments in small and medium health enterprises** to invest in and scale healthcare solutions.
- The new partnership announced will **enhance SAMRIDH's efforts to reach vulnerable populations**, leveraging AIM's expertise in innovation and entrepreneurship.



Identify and support a minimum of 35 to 40 healthcare innovators (over 3 years) by enabling access to affordable capital



Mobilize a capital pool of \$100 million+ from private sector and bilateral organizations to support inclusive business models



Strengthen comprehensive healthcare services focused at the vulnerable 40% of the population with a high disease burden



Reduce the out-of-pocket expenditure (OOPE) for lower economic and underserved communities

How is it different from the SAMRIDH Programme?

- The **Ministry of Electronics & Information Technology (MeitY)** launched the '[Start-up Accelerators of MeitY for Product Innovation, Development and growth \(SAMRIDH\) programme](#)' in August 2021.
- It was launched to **create a conducive platform to Indian Software Product start-ups to enhance their products** and secure investments for scaling their business.

What is the current Healthcare Landscape in India?

- Although India's healthcare sector has grown rapidly over the last five years (Compound Annual Growth Rate of 22%), **Covid-19 has brought to the forefront persistent challenges** such as a weak health system, lack of quality infrastructure, and lack of quality service delivery to vulnerable populations.
- India's **healthcare spending is 3.6% of GDP**, including out-of-pocket and public expenditure.
 - The combined total government expenditure of both central and state is 1.29% of GDP.
 - India spends the least among BRICS countries: Brazil spends the most (9.2%), followed by South Africa (8.1%), Russia (5.3%), China (5%).
- The Government of India has launched the **flagship initiative [Ayushman Bharat \(AB\) Pradhan Mantri Jan Arogya Yojana \(PM-JAY\)](#)** the world's largest non-contributory Government-sponsored health insurance scheme that enables increased access to in-patient healthcare for poor and vulnerable families in secondary and tertiary facilities.

[Source: PIB](#)

Crop Diversification

For Prelims: Crop Diversification, Agroforestry

For Mains: Crop Diversification and its benefits, Need to practice Crop Diversification.

Why in News?

In the annual [Economic Survey](#), the Department of Economic Affairs said that there is an urgent need for [Crop Diversification](#) in view of the **severe water stress in areas** where paddy, wheat and sugarcane are grown as well as to increase oil seed production and reduce dependency on imports of cooking oil.

What is it?

- Crop diversification refers to the **addition of new crops or cropping systems to agricultural production** on a particular farm taking into account the different returns from value-added crops with complementary marketing opportunities.
 - **Cropping System:** It refers to the **crops, crop sequences and management techniques** used on a particular agricultural field over a period of years.
 - **Types:** Major cropping systems in India are sequential-cropping, monocropping, intercropping, relay Cropping, [mixed-cropping](#) and alley cropping.
- Many farmers also use the **mixed crop-livestock system** to increase their standards of living

and income.

- **Animal husbandry or Animal Agriculture** is the branch of science dealing with the practice of breeding, farming and care of farm animals (livestocks) such as cattle, dogs, sheep and horses by humans for advantages.
- It refers to livestock raising and selective breeding. It is a branch of agriculture.

What is the Need for Crop Diversification?

▪ Adversities and Climatic Vagaries:

- A farmer may confront a series of adversities and climatic vagaries during agricultural production, such as **erratic rainfall, stone hail, drought, flood, and so on.**
- In addition, challenges like **post-harvest losses, storage and unavailability of accessible proper marketing** are further aggravating the problem.
 - Currently, the **human-wildlife** and / or **human-crops conflict, forest fires, organic matter deficit soil, monoculture, plant disease and infestation, migration** and the **reluctance of youth** towards agriculture are a new array of problems.

▪ Problems in Maintaining Input Cost:

- For more than five decades, Indian agriculture has been facing severe problems related to an increase in input cost to increase productivity.
- However, the **productivity proportional to input maintains** for a certain time before plateauing and then progressively declines in many cases.

▪ Following Same Pattern extract Specific Nutrients from the Soil:

- Farmers have been using the **common government-promoted Green Revolution cropping pattern** — rice-wheat-rice for a longer time to enhance productivity.
- Unilaterally, **following the same cropping pattern** for a longer period of time has **extracted the specific nutrients from the soil, resulting in soil deficiency** in those nutrients along with a declined **population of microfauna in the soil.**
 - The **microfaunal population is responsible for the mobilisation and absorption of particular nutrients** in the crop rhizosphere.
 - Reduction of the microfaunal population in the soil is a serious issue because **without microfaunal activities, the soil is lost to self-perpetuate** and its ecology for crop production.
- The mono-cropping pattern also **reduces resource-use efficiency.**
- Furthermore, **mono-cropping patterns** have more chances to be **attacked by the same types of insects and pests**, which in turn are controlled by pumping the insecticides and pesticides.

What is Agroforestry and its role in Sustaining Crop Diversification?

▪ About:

- It is a **part of primitive and tribal agriculture** nourished with indigenous technical knowledge.
- Agroforestry is a **land-use system** that includes trees, crops and / or livestock in a spatial and temporal manner, balancing both ecological and economic interactions of biotic and abiotic components. It harnesses the complementarity between trees and crops for efficient utilisation of available resources.
- Agroforestry is practiced for **diversification around the world** in different spheres of biological, ecological, economical and sociological considerations.
 - In North America, for instance, **farmers preferred agroforestry over agriculture** to improve their economic gain and natural resource conservation.
 - In Europe, **agroforestry trees are dominated by oaks, pines, junipers and firs.** In Australia, *Pinus radiata* and *Eucalyptus globulus* while in the African continent, coffee, cocoa, coconut, oil palm, and rubber are common agroforestry trees on farms.
 - The home gardens of the **southern part of India are a classic example** of maintaining temporal and spatial arrangement for crop diversity, with trees resulting in sustainable productivity from the unit area.

▪ Role in Sustaining Crop Diversification:

- Agroforestry can **generate food, feed, fruits, fibre, fuel, fodder, fish, flavour, fragrance, floss, gum and resins as well as other non-wood products** for food and nutritional security. It can also **support livelihoods and promote productive**, resilient agricultural environments in all ecologies.
- Agroforestry **contributes to a multifunctional production system** which enhances biodiversity due to the creation of diverse habitat for macro- and micro-organisms and maintaining landforms for future generations.
- It provides **opportunities to integrate traditionally grown crops**, with other commercial crops such as cereals, oilseeds, pulses, vegetables, fruits in agrihorticulture, hortisilviculture, silviculture, silvofloriculture, silvomedicinal, agrihortisilviculture, aquaforestry, silvipasture, hortipasture.

Way Forward

- Although **there are challenges which can not be ignored**, crop diversification provides an opportunity to double farmers income and create food security for the nation.
- Therefore, the **government must promote crop diversification by purchasing crops produced** other than wheat and rice at **Minimum Support Price**. This could also help conserve the dwindling supply of underground water.
- Agricultural emissions can also be limited through smarter livestock handling, technology-enabled monitoring of fertilizer application, simple changes in field layout and other, more efficient agricultural techniques.

[Source: DTE](#)

Coastal Vulnerability Index

For Prelims: Coastal Vulnerability, CVI, Sea Level Rise, INCOIS, Coastal Multi-Hazard Vulnerability Mapping.

For Mains: Disaster Management, Environmental Pollution & Degradation, Coastal Vulnerability Index and Its Significance.

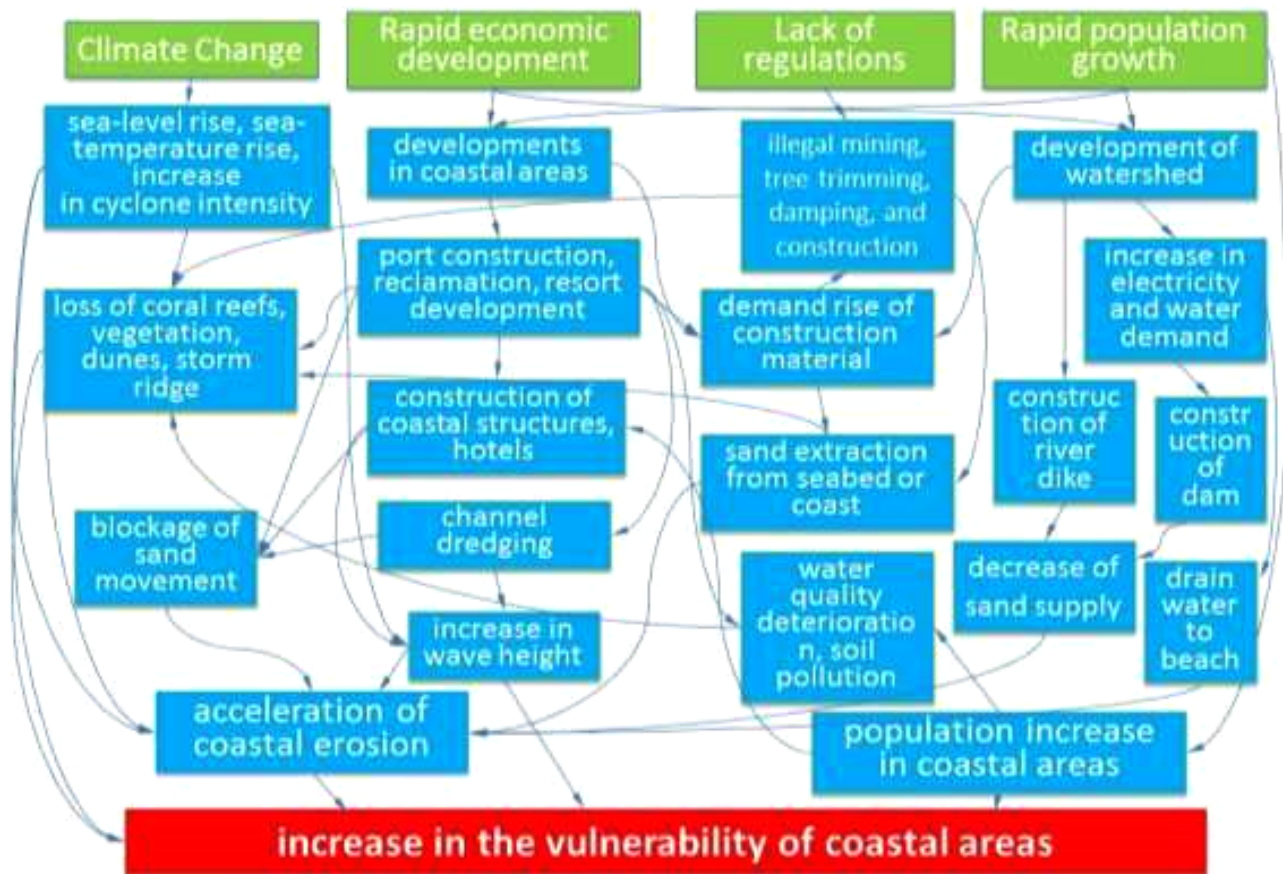
Why in News?

Recently, the [Indian National Centre for Ocean Information Services \(INCOIS\)](#) has carried out a coastal vulnerability assessment for the entire Indian coast at States level.

- The assessment has been conducted to bring out an **Atlas comprising 156 maps on 1:1,00,000 scales** to prepare a **Coastal Vulnerability Index (CVI)**.

What is Coastal Vulnerability?

- Coastal vulnerability is a **spatial concept that identifies people and places that are susceptible to disturbances** resulting from coastal hazards.
- Hazards in the coastal environment, **such as coastal storms, sea level rise and erosion**, pose significant threats to coastal physical, economic, and social systems.



What is the Coastal Vulnerability Index?

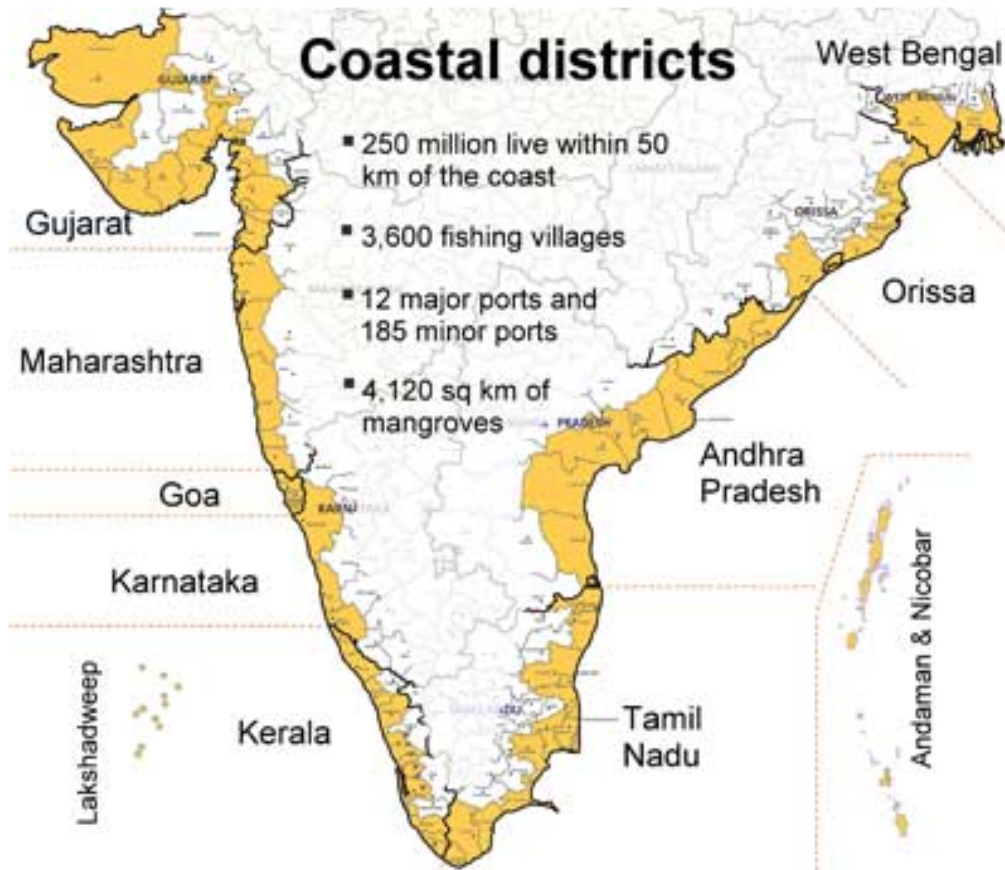
- The maps will **determine the coastal risks due to future sea-level rise** based on the physical and geological parameters for the Indian coast.
- The CVI **uses the relative risk that physical changes** will occur as sea-level rises are quantified **based on parameters like:**
 - Tidal range
 - Wave height
 - Coastal slope
 - Coastal elevation
 - Shoreline change rate
 - Geomorphology
 - Historical rate of relative sea-level change.

What is a Coastal Multi-Hazard Vulnerability Mapping?

- A coastal Multi-Hazard Vulnerability Mapping (MHVM) was also **carried out using above mentioned parameters.**
- These **parameters were synthesised to derive the composite hazard zones** that can be inundated along the coastal low-lying areas due to extreme flooding events.
- This MHVM mapping was carried for the entire mainland of India on a **1:25000 scale.**

What is the Significance of CVI?

- Coastal vulnerability assessments can be **useful information for coastal disaster management and building resilient coastal communities.**
 - India has a coastline of 7516.6 Km i.e. 6100 km of mainland coastline plus coastline of 1197 Indian islands touching 13 States and Union Territories (UTs).



What is INCOIS?

- INCOIS is an **autonomous organisation under the Ministry of Earth Sciences (MoES)**.
- It is **located in Hyderabad & was established in 1999**. It is a unit of the Earth System Science Organisation (ESSO), New Delhi.
 - The ESSO operates as an executive arm of the Ministry of Earth Sciences (MoES) for its policies and programmes.
- It is **mandated to provide the best possible ocean information and advisory services** to society, industry, government agencies and the scientific community through sustained ocean observations and constant improvement through systematic and focused research.

[Source: TH](#)

Geomagnetic Storm

Why in News?

Recently, Elon Musk's [Starlink](#) has **lost dozens of satellites** that were caught in a geomagnetic storm a day after they were launched.

- The satellites were **designed to burn up on reentry into the Earth's atmosphere**, and did not create [debris in space](#).
- However, the loss of 40 satellites — most of a launch batch — in a single solar event has been **described as “unheard of” and “huge”**.

What is Starlink?

- Starlink is a **SpaceX project** to build a broadband network with a cluster of orbiting spacecraft that could eventually number thousands.
- The **Starlink satellites carry Hall thrusters**, which use electricity and krypton gas to generate an impulse, to manoeuvre in orbit, maintain altitude and guide the spacecraft back into the atmosphere at the end of their mission.
- The Starlink network is **one of several ongoing efforts** to start beaming data signals from space.

What is a Geomagnetic Storm?

- Solar Storms occur during the **release of magnetic energy** associated with **sunspots** ('dark' regions on the Sun that are cooler than the surrounding photosphere - the lowest layer of the solar atmosphere), and can last for a few minutes or hours.
- A geomagnetic storm is a **major disturbance of Earth's magnetosphere** that occurs when there is a very **efficient exchange of energy from the solar wind into the space environment** surrounding Earth.
 - The magnetosphere **shields our home planet from harmful solar and cosmic particle radiation**, as well as erosion of the atmosphere by the solar wind - the constant flow of charged particles streaming off the Sun.
- These storms **result from variations in the solar wind** that produce major changes in the currents, plasmas, and fields in Earth's magnetosphere.
 - The solar wind conditions that are effective for creating geomagnetic storms are sustained (for several to many hours) periods of high-speed solar wind, and most importantly, a southward directed solar wind magnetic field (opposite the direction of Earth's field) at the dayside of the magnetosphere.
 - This **condition is effective for transferring energy** from the solar wind into Earth's magnetosphere.
- The largest storms that result from these conditions are associated with solar **Coronal Mass Ejections (CMEs)** where a billion tons or so of plasma from the sun, with its embedded magnetic field, arrives at Earth.
 - CMEs are large ejections of plasma and magnetic fields that **originate from the Sun's corona** (outermost layer).

How does it Affect Earth?

- **Can Impact Space Weather:**
 - Not all solar flares reach Earth, but solar flares/storms, **Solar Energetic Particles (SEPs)**, high-speed solar winds, and **Coronal Mass Ejections (CMEs)** that come close can impact space weather in **near-Earth space and the upper atmosphere**.
- **Can Hit Operations of Space-Dependent Services:**
 - Solar storms can hit operations of space-dependent services like **Global Positioning Systems (GPS)**, radio, and satellite communications. Aircraft flights, power grids, and space exploration programmes are vulnerable.
- **Can Potentially Create Disturbances in the Magnetosphere:**
 - **Coronal Mass Ejections (CMEs)** with ejectiles loaded with matter travelling at millions of miles an hour, **can potentially create disturbances in the magnetosphere**, the protective shield surrounding the Earth.
 - Astronauts on spacewalks face health risks from possible exposure to solar radiation outside the Earth's protective atmosphere.

How are Solar Storms Predicted?

- Solar physicists and other scientists use **computer models to predict solar storms** and solar

activities in general.

- Current models are **capable of predicting a storm's time of arrival** and its speed.
- But the storm's structure or orientation still cannot be predicted.
- Certain orientations of the magnetic field **can produce a more intense response** from the magnetosphere, and trigger more intense magnetic storms.
 - With the **increasing global dependence on satellites** for almost every activity, **there is a need for better space weather forecasts** and more effective ways to protect satellites.

[Source: IE](#)

Accelerate Vigyan Scheme

Why in News?

Recently, the **Science and Engineering Research Board (SERB)**, has invited applications under '**ABHYAAS**', a program of '**Accelerate Vigyan**' scheme, for summer season.

- SERB is an **autonomous body** of the Department of Science & Technology (DST), Union Ministry of Science & Technology..

What is the Accelerate Vigyan Scheme?

- "Accelerate Vigyan" (AV) strives to **provide a big push to high-end scientific research and prepare a scientific workforce**, which can venture into research careers and a knowledge-based economy.
- AV aims to **expand the research base in the country**, with three broad goals — consolidation / aggregation of all scientific training programs, initiating high-end orientation workshops and creating opportunities for training and skill internships.

What are the Components of the Accelerate Vigyan Scheme?

- **ABHYAAS:**

- It is a program of AV scheme, is an **attempt to boost research and development** in the country by enabling and grooming potential postgraduate / PhD students by developing dedicated research skills in selected areas / disciplines / fields through its two components — **high-end workshops ("KAARYASHALA")** and **Training and Skill Internship ("VRITIKA")**.
 - This is especially important for researchers with limited opportunities to access such learning capacities / facilities / infrastructure.

- **SAMMOHAN:** It has been sub-divided into **SAYONJIKA and SANGOSHTI**.

- **SAYONJIKA** is an open-ended program to catalogue capacity building activities in science and technology supported by all government funding agencies in the country.
- **SANGOSHTI** is a pre-existing program of SERB for the organisation of workshops.

How are such Steps Helpful?

- **Capacity Building:** The database of skilled manpower developed across different disciplines through all the sub-components of the AV would help in capacity building.
- **Social Responsibility:** The scheme also seeks to garner the social responsibility of the scientific

community in the country.

What are the Initiatives taken to boost S&T in Budget 2022-23?

- An outlay of **Rs 50,000 crore** was announced spread over five years, for [National Research Foundation](#).
 - It will ensure that the overall research ecosystem of the country is strengthened with focus on identified national-priority thrust areas.
- The budget also **declared the setting up of umbrella structures** in nine cities for building better synergies among R&D institutions, Universities and Colleges supported by the government while also retaining their internal autonomy.
 - This will be coordinated by the **Ministry of Education**, and a **Glue Grant** will be set aside for this purpose.
 - The **Department of Biotechnology** is implementing the **URJIT clusters** (University Research Joint Industry Translation Clusters) which are being set up in 10 locations as per the Budget Announcement in February 2020.
 - These will complement the activities of the **Umbrella Structures**.

[Source: DTE](#)

Atal Tunnel

Why in News?

Atal Tunnel has officially been **certified by World Book of Records** as the **'World's Longest Highway Tunnel** above 10,000 Feet'.

- World Book of Records UK, is an **organisation that catalogues and verifies extraordinary records** across the world with authentic certification.
- It was built by the [Border Roads Organisation \(BRO\)](#).

What are the features of the Atal Tunnel?

- The **9.02-km tunnel is the longest highway tunnel** in the world above the height of 3,000 metres.
- It **cuts through a mountain west of the Rohtang pass** and shortens the distance between **Solang Valley and Sissu** by around 46 km and takes around 15 minutes to cover. Earlier, it would take nearly 4 hours to travel between the two points.
 - **Rohtang Pass** (elevation 3,978 m) is located in the state of Himachal Pradesh.
 - It is present on the **Pir Panjal Range of Himalayas**.

How is this Tunnel Significant?

- **All year Connectivity:** The Atal tunnel is the **first step towards all-year connectivity** to Ladakh. The tunnel has the **potential to link Ladakh to Manali and Chandigarh** throughout the year, as it **bypasses Rohtang Pass**, which is snowed in through the winter months.
- **Strategic:** The tunnel **provides a strategic advantage to the country's armed forces** by

providing year-long connectivity to border areas. It will save an entire day for troops and supplies as they move towards forward posts.

- **Avail Basic Facilities:** The **residents of Ladakh** who had to face immense hardship to avail even basic facilities like healthcare and food supplies now are able to reach Manali and connect with the rest of the country using this new tunnel. Essential commodities like petrol and vegetable supplies would also likely be available throughout the year.
- **Boon for Farmers:** The **drop in travel time helps many**, especially farmers whose precious crops like peas and potatoes will no longer rot in trucks before reaching the market.
- **Boost to Tourism:** The region has seen an **unprecedented increase in the arrival of tourists**, and in a little more than a year, the valley and the state have witnessed growth in the socio-economic domains.

[Source: PIB](#)

India's Newest Mammal: White Cheeked Macaque

Why in News?

Recently, the Scientists from the [Zoological Survey of India \(ZSI\)](#) have found a new mammal species in the country — the **White Cheeked Macaque** (*Macaca leucogenys*).

- While the species was **first discovered in China in 2015**, its existence was not known in India before this.
- It is only now that Indian scientists have discovered its presence in the remote Anjaw district in **central Arunachal Pradesh**.
- The latest discovery takes **India's mammal count from 437 to 438**.



What is Unique about White Cheeked Macaque?

- The White Cheeked Macaque has distinct white cheeks, long and thick hair on the neck and a longer tail than other Macaque species.
- It is the **last mammal to have been discovered in Southeast Asia**.
- Both the Arunachal macaque as well as the White Cheeked Macaque exist in the same biodiversity hotspot in the eastern Himalayas.
 - Along with White-Cheeked Macaques and Arunachal Macaque (*Macaca munzala*) the **other species of Macaques** are Assamese Macaque (*Macaca assamensis*) and Rhesus Macaque (*Macaca mulatta*) reported from the same landscape.
 - The **potential threat** to all species of macaques in the landscape are due to hunting by locals for consumption and habitat degradation due to urbanisation and infrastructure

development.

- This species is **not covered by the Wildlife Protection Act of India**, because till now it is not known that the species existed in India.

[Source: IE](#)

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