

INFRASTRUCTURE

❖ **What is Kerala's SilverLine rail project, why has the govt recalled officials involved in it?**

❖ **CONTEXT: The Kerala state government has decided to recall the revenue officials deployed to conduct a social impact assessment (SIA) study for land acquisition regarding the SilverLine rail corridor project.**

- With the Union Government yet to give its nod for Kerala's proposed semi-high-speed rail corridor, or K-Rail, here is where the project stands today and why it has seen opposition since its announcement.

➤ **What is the Silverline project?**

- The proposed 529.45-km railway line will link Thiruvananthapuram in the south to Kasaragod in the north, covering 11 districts through 11 stations within four hours, at a speed of 200 km/hr. On the existing Indian Railways network, it now takes 12 hours.

- The deadline for the project, being executed by the Kerala Rail Development Corporation Limited (KRDCL), is 2025. KRDCL, or K-Rail, is a joint venture between the Kerala government and the Union Ministry of Railways created to execute big railway projects.

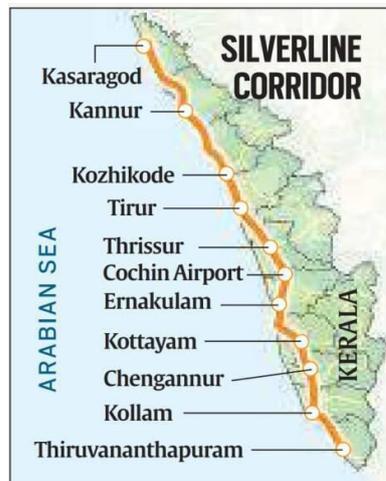
➤ **Why is the K-Rail needed?**

- Urban policy experts have long been arguing that the existing railway infrastructure in Kerala cannot meet the demands of the future.

- Most trains run at an average speed of 45 km/hr due to a lot of curves and bends on the existing stretch.

- The government claims the SilverLine project can take a significant load of traffic off, make travel faster for commuters and reduce congestion on roads.

- The line will have stations in Kollam, Chengannur, Kottayam, Ernakulam (Kakkanad), Cochin Airport, Thrissur, Tirur, Kozhikode and Kannur before culminating at Kasaragod.



➤ **What is the current status of the project?**

- The state government began the process of land acquisition after the state's cabinet approval in June 2021. Out of 1,383 hectares needed to be acquired, 1,198 hectares will be private land. The Cabinet has also approved administrative sanction to get Rs 2,100 crore from the Kerala Infrastructure Investment Fund Board (KIIFB), the central investment arm of the government.

- While Chief Minister has written to Prime Minister requesting his 'personal intervention' to give all necessary clearances, the Centre has only given in-principle approval to the project.

➤ **Why have protests taken place against SilverLine?**

- Kerala witnessed violent protests in several parts of the state early 2022 after the Revenue Department started demarcating the proposed project routes for SIA. The Opposition joined hands with the local protests against the ambitious project of the state government. In many places, the survey had to be suspended as a result.

- A petition signed by 17 Opposition MPs from the state said the project was an "astronomical scam in the making" and would sink the state further into debt. The petition, addressed to the Union Railways Minister, said the project was financially unviable and would lead to displacement of over 30,000 families.

- In March 2022, Railways Minister told in the Lok Sabha that environmental concerns are "real". Activists have alleged environmental harm as the route cuts through precious wetlands, paddy fields and hills. The Kerala Parishthi Aikya Vedi, a forum of ecology experts, has urged the government to abandon the project and explore sustainable solutions.

- E Sreedharan, former Delhi Metro head who has, termed the project "ill-conceived" and defectively planned.

- In July 2022, the Railway Board informed the Kerala High Court that it has neither approved nor concurred with SIA and the survey was being held by the Kerala government. It submitted the affidavit after the High Court directed the Centre to disclose whether Kerala Rail Development Corporation Ltd had been instructed by the Board not to be part of SIA for the purpose of the project.

SCIENCE AND TECHNOLOGY

❖ **How FIFA is using SAOT for offside decisions**

❖ **CONTEXT: In the opening match of the FIFA World Cup 2022 between host Qatar and Ecuador, just three minutes' of action had passed before the first goal of the tournament was**

ruled out for offside. Ecuador forward Enner Valencia's headed strike was disallowed because the lower half of his right leg was in an offside position.

- While such close calls being settled with the help of Video Assistant Referee (VAR) technology is largely commonplace in modern-day football, what surprised fans was the speed with which it was adjudicated.
- One three-dimensional animation of the incident was displayed for a fleeting second or two before play restarted. FIFA's brand new Semi-Automated Offside Technology (SAOT) was responsible for the quick decision.

➤ **What is SAOT?**

- There are two parts to the technology — a sensor inside the match ball (Adidas's Al Rihla) that is held using suspension technology, and existing tracking tools that are part of the VAR system as we know.
- Kinexon, a German company that specialises in providing sensor networks and computing solutions, has designed a small in-ball device which gives precise positional data and also detects ball movement in a three-dimensional space.
- Every time the ball is hit, data is sent in real time (at a whopping 500 frames per second) to a network of antennae installed around the playing field.
- Additionally, there are 12 Hawk-Eye cameras set up around the turf that shadow both the ball and the players, with as many as 29 separate points in the human body tracked.
- The coming together of the ball sensor and the Hawk-Eye cameras is in effect SAOT, which according to FIFA allows for decisions that are highly accurate and quick.
- These two data sets are run through artificial intelligence software which generates automated alerts about offsides to the match officials. This replaces the manual effort taken in poring over replays for minutes on end.

➤ **Is there no human intervention?**

- According to FIFA, SAOT is only a confirmatory tool and the final decision "always belongs to the match official — on the VAR, the video assistant referee, on the field of play, to the referee."
- In addition, the differentiation that exists between normal offside — where a player is flagged because of active involvement irrespective of whether he touches the ball — and 'passive offside' — where a player will not be flagged despite being in an offside position if he does not touch the ball — is expected to retain some subjectivity.
- A case in point was the goal scored by Ecuador against the Netherlands that was eventually disallowed; the player was in an offside position and did not touch the ball but was deemed offside for being in the goalkeeper's line of sight and thus actively involved.

➤ **How accurate is the SAOT data?**

- The data transmission rate from the ball (500 frames per second or 500Hz) makes the process pretty accurate. The time between two frames is two milliseconds (1/500), which is 10 times better than a standard 50Hz video that is commonly used in High Definition monitors.
- Further, to synchronise the data from the ball sensor and Hawk-Eye, a Precision Time Protocol clock is used. This gets down the precision to up to one-millionth of a second. FIFA tested the whole technology at both the 2021 FIFA Arab Cup in Qatar and the 2021 FIFA Club World Cup in Abu Dhabi.

➤ **Is the data only used for officiating?**

- Experts believe offside decision-making is just the starting point and the wealth of tracking data will soon be used by coaches for tactical analyses and gauging individual athlete performances.
- The metrics can also be useful for scouting good players, similar to what Second Spectrum tracking does in the NBA.
- Hawk-Eye has been in use in tennis since 2006. Though it was first employed to decide close line calls, the positional information is a treasure trove for players and coaches looking for data on ball trajectories, movement, distances covered and the pace of the court among others.
- SAOT is expected to aid such statistical thinking and data mining in football, in line with what is increasingly the Moneyball era of sports.

PRELIMS

1. Re-Hab Project

- ❖ **KVIC Chairman Shri Manoj Kumar inaugurated the Re-Hab Project (Reducing Human Attacks using Honey Bees) by Khadi and Village Industries Commission at village Chausla, in Haldwani, District Nainital, where he also distributed 330 Bee-boxes, bee-colonies and toolkits along with the honey extractors to the rural beneficiaries in Chausla village.**

- That Khadi & Village Industries Commission (KVIC) is running this project called Re-Hab in 7 states of the country, namely in Karnataka, Maharashtra, West Bengal, Assam and Orissa, where attacks of the elephants is more common, and under this project fencing of bee boxes is installed in such areas from where elephants move towards the human settlements and farmers' agriculture. Fencing of Bee-boxes on the routes of movement of elephants blocks the path of wild elephants. In this way, through honey-bees, elephants can be prevented from attacking humans and destroying farmers' crops.
- As a new initiative, the Re-Hab project will be run by KVIC at selected locations for a period of one year.
- In order to realize the call of "Sweet Revolution" by Prime Minister and to provide self-employment opportunities to the unemployed youth of the country, and to increase the income of the farmers, the Honey Mission program is implemented under the Khadi and Gramodyog Vikas Yojana, in the entire country from the year 2018-19.
- The beneficiaries of this scheme are provided with 10 bee-boxes, bee-colonies and toolkits after completion of the beekeeping training provided by KVIC.
- Under the Honey Mission program in the state of Uttarakhand, from the year 2018-19 to 2021-22 a total of 7120 Bee-boxes, Bee-colonies and toolkits, and other equipments have been distributed to a total of 712 unemployed and farmers, out of which 3910 Bee-boxes have been distributed to 391 Scheduled Caste beneficiaries, 790 Bee-boxes to 79 Scheduled Tribe beneficiaries, and 2420 Bee-boxes to 242 general category beneficiaries.

2. **SARAS radio telescope**

❖ **CONTEXT: India's SARAS radio telescope provides astronomers clues to the nature of Universe's first stars and galaxies**

- Scientists have determined properties of radio luminous galaxies formed just 200 million years post the Big Bang, a period known as the Cosmic Dawn thus providing an insight to the properties of the earliest radio loud galaxies that are usually powered by supermassive black holes.
- Humans in their curiosity about how the early stars and galaxies formed and what they looked like have tried to capture the faint signals arising from the depths of the cosmos through a number of ground and space-based telescopes peering into the sky for a better understanding of the Universe.
- Shaped Antenna measurement of the background Radio Spectrum 3 (SARAS) telescope -- indigenously designed and built at Raman Research Institute -- was deployed over Dandiganahalli Lake and Sharavati backwaters, located in Northern Karnataka, in early 2020.
- In a first-of-its-kind work, using data from SARAS 3, researchers from the Raman Research Institute (RRI), Bengaluru, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia, along with collaborators at the University of Cambridge and the University of Tel-Aviv, estimated the energy output, luminosity, and masses of the first generation of galaxies that are bright in radio wavelengths.
- Scientists study the properties of very early galaxies by observing radiation from hydrogen atoms in and around the galaxies, emitted at a frequency of approximately 1420 MHz. The radiation is stretched by the expansion of the universe, as it travels to us across space and time, and arrives at Earth in lower frequency radio bands 50-200 MHz, also used by FM and TV transmissions.
- The cosmic signal is extremely faint, buried in orders of magnitude brighter radiation from our own Galaxy and man-made terrestrial interference. Therefore, detecting the signal, even using the most powerful existing radio telescopes, has remained a challenge for astronomers.
- Results from the paper by scientist from CSIRO published in the journal on November 28, 2022, have described how even non-detection of this line from the early Universe can allow astronomers to study the properties of the very first galaxies by reaching exceptional sensitivity.
- "The results from the SARAS 3 telescope are the first time that radio observations of the averaged 21-centimeter line have been able to provide an insight to the properties of the earliest radio loud galaxies that are usually powered by supermassive black holes.
- "SARAS 3 has improved the understanding of astrophysics of Cosmic Dawn, telling that less than 3 percent of the gaseous matter within early galaxies was converted into stars, and that the earliest galaxies that were bright in radio emission were also strong in X-rays, which heated the cosmic gas in and around the early galaxies.

3. **Shakti Scheme**

❖ **CONTEXT: Ministry of Power kicks off a Scheme for Procurement of Aggregate Power of 4500 MW on competitive basis or five years on Finance, Own and Operate (FOO) basis under B (v) of SHAKTI Policy.**

- The SHAKTI (Scheme for Harnessing and Allocating Koyala Transparently in India) policy was approved in May 2017 with the intent of better allocation of coal to present and future power plants.
- It aimed to phase out the present Letter of Assurance and Fuel Supply Agreement (FSA)-based regime, and instead introduce a more transparent and competitive coal allocation policy.
- The policy also offered a potential solution to the lack of coal linkages to 17 power plants with a capacity of about 15,000 MW, which were part of the 34 power plants (of about 40,000 MW) declared as stressed.

➤ **Objectives**

- The aim of the Shakti scheme is to ensure the availability of coal to all the Thermal Power Plants in India, in a way that is transparent and objective. At the same time, it aims to transfer the benefits of linkage coal to the end consumers.
- The scheme is supposed to be beneficial not just for the infrastructure sector, but also for the public sector banks which have huge loans unpaid at the end of the power companies.
- The Companies, which did not have coal linkages before the introduction of the Shakti Scheme, would benefit when they would get domestic fuel supplies through auction at competitive rates.
- The scheme also aims to reduce the dependence on imported coal and promote domestic industries.

➤ **Features**

- New and more transparent coal linkage policy, that is auction-based.
- Thermal Power Plants (TPP) that have Letter of Assurances would be eligible to sign Fuel Supply Agreement ensuring that the plants that are commissioned have achieved their respective milestones like achieving financial closure, obtaining clearances, etc. They also need to fulfill all the required conditions of the Letter of Assurances within the specified duration of time and nothing adverse should be detected against the Letter of Assurances holders.
- Thermal Power Plants (part of 78000 MW) that could not be commissioned by Financial Year 2015 would be eligible for coal drawl if the plants have been commissioned before Financial Year 2022.
- The allocation of linkages for the power sector would be auction-based or through Power Purchase Agreement (PPA) based on competitive bidding of tariffs. The State and the Central Power Generating companies would be the exceptions to this, alongside the exceptions provided in the 2016 Tariff Policy.
- The drawl of coal would be permitted against the valid Long-Term Power Purchase Agreements and to be concluded Medium Term Power Purchase Agreements.
- All projects with linkages would be supplied coal as per their entitlement. This will further make sure that the rights of coal supplies for the holders of the Fuel Supply Agreement are ensured and also the signing of the Fuel Supply Agreement with Letter of Assurance holders.
- Shakti scheme ensures the optimal allocation of the natural resource across power units.
- There is supposed to be a direct linkage allocation to public-sector plants and reverse auction for the supply of coal linkages to private players. It also connects fuel linkage to the tariff-based competitive bidding for long-term power purchase by distribution companies. The view is to ensure that firms with fuel supplies are not deprived of Power Purchase Agreements and vice versa.
- Policy directions are supposed to be issued by the Ministry of Coal and Ministry of Power. The Coal India Limited/Singareni Collieries Company Limited and different power entities of the State and Central Government are responsible for the implementation of the policy.

ANSWER WRITING

Q. Analyze internal security threats and transborder crimes along Myanmar, Bangladesh and Pakistan borders including Line of Control (LoC). Also discuss the role played by various security forces in this regard.

India has a large and complex border covering around 15106.7 km, which it shares with Bangladesh, China, Pakistan, Nepal, Myanmar, Bhutan as well as a small portion with Afghanistan.

Challenges in the effective border management particularly to Myanmar, Bangladesh and Pakistan:

- India-Myanmar Border: The northeastern states of Arunachal Pradesh, Nagaland, Manipur, and Mizoram share the border with Myanmar. Some of the insurgent groups like the National Socialist Council of Nagaland (NSCN) and the United Liberation Front of Asom (ULFA) operate from

Myanmar, which threatens the security of India as well as Myanmar. Porous nature of the border provides safe route to human traffickers, illegal arms dealers, drug smugglers etc.

- **India-Bangladesh Border:** The Indo-Bangladesh Border (4,096 km) passes through West Bengal, Assam, Meghalaya, Tripura, and Mizoram. The entire stretch consists of plains, riverine belts, hills and forests which make illegal migration easy. Illegal migration across this border poses serious security threats and acts as a fertile ground for organizations like the Inter-Services Intelligence of Pakistan to penetrate and expand their activities. Also, the poor law and order situation at the border has led to smuggling of arms and drugs. Supply of arms help in sustaining any conflict.
- **India-Pakistan Border:** Indo-Pakistan Border (3,323 km) runs along the states of Gujarat, Rajasthan, Punjab and Jammu & Kashmir. Direct accessibility of the borders and some technological developments enabling quick passage of information and transfer of funds has changed the focus and tenor of border security. Cross-border terrorism from Pakistan has exacerbated due to non-recognition of boundaries by its terrorist groups and their success in acquiring legitimacy due to religious or ethnic identity.

Role played by various security forces in this regard

- **Assam Rifles:** This force significantly contributed to opening the region to administration and commerce and over time they came to be known as the right arm of the civil and left arm of the military.
- **Border Security Force:** The BSF has air wing, marine wing, an artillery regiment, and commando units. It currently stands as the world's largest border guarding force. BSF has been termed as the First Line of Defence of Indian Territories. It is India's primary border guarding organization on its border with Pakistan and Bangladesh.
- **Sashastra Seema Bal:** The sole objective of this force is achieving 'total security preparedness' in the remote border areas for performing a 'stay-behind' role in the event of a war. SSB is now spread along the International Border across Uttarakhand, UP, Bihar, West Bengal, Sikkim, Assam, and Arunachal Pradesh.

India should endeavor to meaningfully engage with Myanmar, Bangladesh and Pakistan and solicit their cooperation in resolving all outstanding issues and better manage their mutual border.

MCQs

1. Consider the following statements in relation to the Shakti Scheme for Harnessing and Allocating Koyala transparently in India:
 1. The scheme is supposed to be beneficial not just for the infrastructure sector, but also for the public sector banks which have huge loans unpaid at the end of the power companies.
 2. The Companies, which did not have coal linkages before the introduction of the Shakti Scheme, would benefit when they would get domestic fuel supplies through auction at competitive rates.
 3. The scheme also aims to reduce the dependence on imported coal and promote domestic industries.
 Which of the above-mentioned statements are true?

a) 1 only b) 2 only c) 1 and 3 only **d) All of the above**
2. Which of the following place to gets India's first private space launchpad?

a) Thiruvananthapuram **b) Sriharikota**
c) Dr Abdul Kalam Island d) Vishakhapatnam
3. Mauna lao volcano recently seen in news because of it starts to erupt, which of the following statement/s is/are not correct with regards to this?
 1. Like all Hawaiian volcanoes, Mauna Loa was created as the Pacific tectonic plate moved over the Hawaii hotspot
 2. Mauna Loa is the largest subaerial volcano among the five volcanoes that form the Island of Hawaii
 3. Like other Hawaiian volcanoes Lava eruptions from Mauna Loa are silica rich and tend to be very explosive.
 Choose the correct answer using the codes given below

a) 1 and 2 only b) 2 only c) 1 and 3 only **d) 3 only**
4. Consider the following statements SARAS telescope
 1. SARAS is a niche high-risk high-gain experimental effort of RRI (Raman Research Institute).
 2. Radio telescopes collect weak radio light waves, bring it to a focus, amplify it and make it available for analysis.
 Which of the above statement/s is/are correct?

a) 1 only b) 2 only **c) Both 1 and 2** d) Neither 1 nor 2

5. With reference to SOAT technology consider the following statements
1. The SAOT is an extension of the Video Assistant Referee (VAR) system.
 2. The technology application is limited to the football only.
- Choose the correct statement/s using the using the codes given below
- a) **1 only**
 - b) 2 only
 - c) Both 1 and 2
 - d) Neither 1 nor 2
6. Silver line rail project often mentioned in news is related to which of the following state?
- a) Karnataka
 - b) **Kerala**
 - c) Maharashtra
 - d) Gujarat
7. Consider the following statements about Project RE-HAB
1. It was set up to prevent elephant attacks in human settlements.
 2. It is one of the National Honey Mission's sub-missions.
 3. Ministry of Environment, Forest and Climate change is the nodal ministry to carry out the project (KVIC).
- Which of the statements given above is/are correct?
- a) **1 and 2 only**
 - b) 2 only
 - c) 1 and 3 only
 - d) All of above
8. Consider the following statements regarding Khadi & Village Industries Commission.
1. The Khadi and Village Industries Commission (KVIC) is a statutory body.
 2. Its objective is to provide employment in rural areas and create self-reliance amongst people and building up a strong rural community spirit.
 3. It functions under the Ministry of Micro, Small and Medium Enterprises.
 4. KVIC has been developing recyclable plastic-mixed handmade paper under Project REPLAN (REducing PLAstic from Nature)
- Which of the above statements is/are correct?
- a) 1, 2,4 only
 - b) 2, 3 only
 - c) 1, 3,4 only
 - d) **1, 2, 3 and 4**
9. With reference to exercise 'Harimau Shakti-2022' consider the following
1. The exercise is an annual training event between the Indian Air force and the Malaysian Air force being held since 2012
 2. The recent edition commenced at Kluang, Malaysia.
- Choose the correct statement/s using the codes given below
- a) 1 only
 - b) **2 only**
 - c) Both 1 and 2
 - d) Neither 1 nor 2
10. The term Bluebugging recently seen in news , With reference to it consider the following statements
1. It is a form of hacking that lets attackers access a device through its discoverable Bluetooth connection.
 2. Bluebugging can happen whenever a Bluetooth-enabled device is within a 10-meter radius of the hacker.
- Which of the above statements is/are correct?
- a) 1 only
 - b) 2 only
 - c) **Both 1 and 2**
 - d) Neither 1 nor 2