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Cryptojacking

News: According to a report by SonicWall, a US-based cybersecurity firm 'Cryptojacking' attacks on computer systems have gone up by 30% to 66.7 million in the first half of 2022 compared to the first half of last year.

GS Paper 3: Science and Technology- Developments and their Applications and Effects in Everyday Life; Awareness in the fields of IT, Space, Computers.

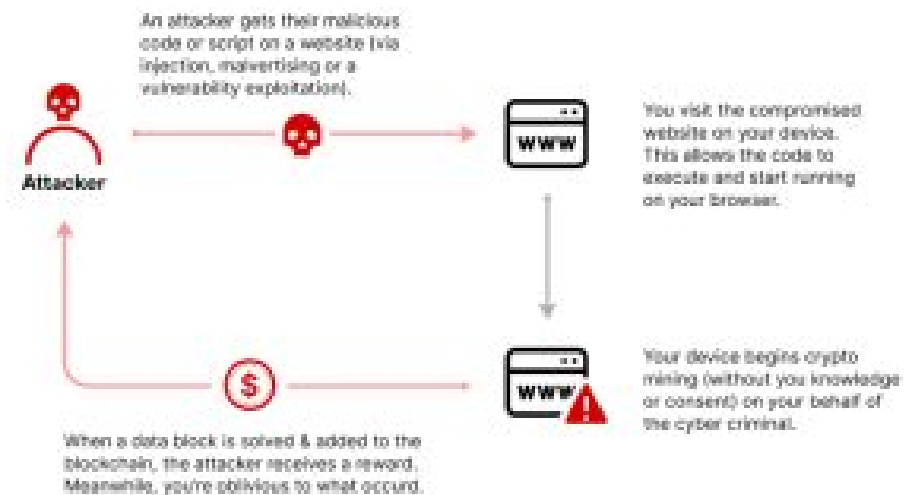


What is cryptojacking?

- Cryptojacking is a **cyber attack** wherein a computing device is hijacked and controlled by the attacker, and its resources are **used to illicitly mine cryptocurrency**.
- In most cases, the malicious programme is installed when the user clicks on an unsafe link, or visits an infected website — and unknowingly provides access to their Internet-connected device.

Why is cryptojacking done and how is it different from coin mining?

- **Coin mining** is a legitimate, competitive process used to release new crypto coins into circulation or to verify new transactions. It involves solving complex computational problems to generate blocks of verified transactions that get added to the blockchain. The reward for the first miner who successfully manages to update the crypto ledger through this route is crypto coins.
- But the race to crack this 64-digit hexadecimal number code needs considerable computing power involving state-of-the-art hardware, and electrical power to keep the systems involved up and running.
- **Cryptojackers** co-opt devices, servers, and cloud infrastructure, and use their resources for mining. The use of **'stolen' or** cryptojacked resources slashes the cost involved in mining.



What are the main methods that cryptojackers use to maliciously mine for cryptocurrencies?

- **File-Based Cryptojacking:** With file-based cryptojacking, **malware is downloaded and runs an executable file** that spreads a cryptomining script throughout the IT infrastructure. One of the most common ways that cryptojacking occurs is by using malicious emails. An email is sent containing an attachment or link that looks legitimate. When a user clicks on the attachment or link, code is executed that downloads the cryptomining script onto the computer. This script works in the background without the user's knowledge.
- **Browser-Based Cryptojacking:** Cryptojacking attacks can take place directly within a web browser, using IT infrastructure to mine for

cryptocurrency. Hackers create a cryptomining script using a programming language and then embed that script into numerous websites. The script is run automatically, with code being downloaded onto the users' computer. These malicious scripts can be embedded in ads and vulnerable and out of date WordPress plugins. Cryptojacking can also happen through a supply chain attack, where cryptomining code compromises JavaScript libraries.

- **Cloud Cryptojacking:** When hackers use cloud cryptojacking, they search through an organization's files and code for Application Programming Interface(API) keys to access their cloud services. Once access is gained, hackers siphon unlimited CPU resources for cryptomining, resulting in a huge increase in account costs. Using this method, hackers can significantly accelerate their efforts of cryptojacking to illicitly mine for currency.



How does Cryptojacking Work?

- **Compromise an Asset to Embed Script:** Cyberhackers, also known as threat actors, compromise an asset by embedding cryptomining code using one of the three methods above.
- **Execute Cryptomining Script:** Once embedded, cryptojackers are counting on victims to execute the script. Users either click on an attachment or link to execute and run the cryptomining script or browse to a website with infected ads.
- **Cryptomining Begins:** After being executed, the cryptomining script runs in background, without the knowledge of the user.
- **Solving Algorithms:** The script uses computer power to solve complex algorithms to mine what is called a "block." These blocks are added to a

blockchain, the technology which stores digital information about cryptocurrency.

- **Jackers Receive a Cryptocurrency Reward:** Each time a hacker adds a new block to the chain they receive cryptocurrency coins. Without very little work or risk, these threat actors are able to gain reward in cryptocurrency that they can anonymously put directly into their digital wallets.

How to detect cryptojacking?

- Be aware of decrease in performance in computing devices.
- Look for overheating of devices and running fans for cooling.
- Monitor computer for an increase in CPU usage.
- Check for coding and file changes on your site.
- Scan for malware to monitor your websites.
- Follow crypto news and look for parallels on your site.

What are the signs that a device is attacked by cryptojacking?

- Device slowing down.
- Device heating up.
- Battery of the device drained faster than usual.

Why have cryptojacking incidents gone up?

- Crackdown on ransomware attacks by agencies is forcing cybercriminals to look for alternative methods.
- Cryptojacking involves lower risk, and promises potentially higher payday.
- Cryptojacking is **hard to detect** and the **victims of these attacks mostly remain unaware** that their systems have been compromised.
- Unlike ransomware which announces its presence and relies heavily on communication, **cryptojacking has a lower potential** of being detected by the victims, as cryptojacking can succeed without the victim ever being aware of it.
- **It's hard to tie cryptojacking to criminal activity:** As unsuspecting users across the world see their devices get unaccountably slower, but it's hard to tie it to criminal activity, much less point to the source.

Why should this be a concern?

- Large number of individuals and businesses are on the target list of cryptojackers.
- According to the report, cryptojacking incidents targeting the retail industry rose by 63% year-to-date, while similar attacks on the financial industry skyrocketed 269%.

- According to Interpol the primary impact of cryptojacking is performance-related, though it can also increase costs for the individuals and businesses affected because coin mining uses high levels of electricity and computing power.

How to Prevent Cryptojacking?

- Train professions to detect **cryptojacking**.
- Not to click on links on emails.
- Use **Anti-Cryptomining Extensions**.
- Use Ad-Blockers to block malicious code in online ads.

Sharad

Jio's 'standalone' 5G architecture.

GS Paper 3: Changes in industrial policy and their effects on industrial growth and Science and Technology- developments and their applications and effects in everyday life.

News: India's largest telecom company Reliance Jio on Monday announced the launch of its 5G services in Delhi, Mumbai, Kolkata, and Chennai by Diwali this year, with an aim to expand and cover the entire country by December 2023. The company said it will launch its 5G services on a **"standalone" 5G architecture**, against the "non-standalone" approach that other operators are betting on.

What are the various generations of mobile networks?

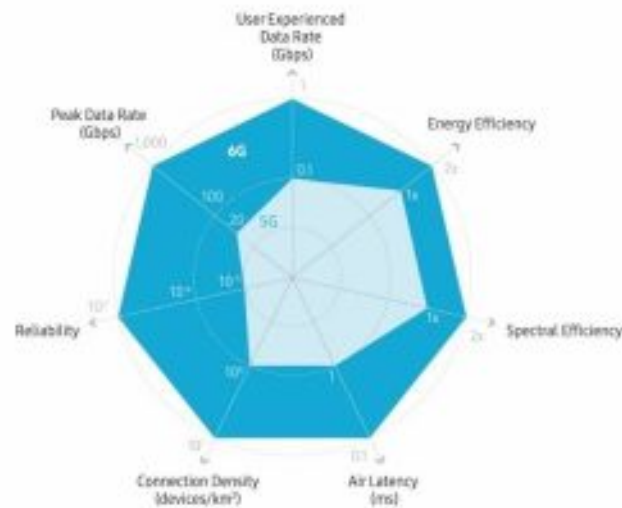
- **First generation – 1G, 1980s:** 1G delivered **analog voice**. Launched in the late 1970s in Japan, 1G was the first generation of mobile telecommunication technology that offered voice calls only. But it came with **low sound quality, low coverage, and without any roaming support**.
- **Second generation – 2G, Early 1990s:** 2G introduced **digital voice (e.g. CDMA- Code Division Multiple Access and GSM-Global System for Mobile communication)**. It allowed users to roam and offered small data services like SMS and MMS at a maximum speed of around 50 kbps. While the **focus was still on voice calling**, data support was introduced. 2G continues to be popular in India even as it is being gradually phased out in many parts of the world. Jio, a major service provider in the country, last year set itself a goal of **'2G-mukt Bharat'** — to "free 300 million subscribers still trapped in the 2G era"

- **Third generation - 3G, Early 2000s:** 3G brought mobile data (e.g. CDMA2000). Mobile technology kept its date with generational leap every decade with the introduction of 3G services in 2001. **It promised four times faster data transmission with access to mobile Internet.** This is the generation that **brought emails, navigational maps, video calling, web browsing and music to mobile phones.** It was also during this generation that BlackBerry phones became the rage, and subsequently, Steve Jobs introduced the world to the 'App Store' with the launch of iPhone 3G in 2008.
- **Fourth generation - 4G LTE, 2010s:** 4G LTE ushered in the era of mobile broadband. **High speed, high quality, high capacity voice and data services** – that's the promise that 4G, the network most of us use today, brought with it around 2010. **Standard 4G came with five to seven times faster speeds than 3G.** Compared to 3G, a phone on a 4G network got quicker response to its requests (lower latency). This is what made our phones more like **hand-held computing devices.**
- **Fifth generation - 5G:** 5G is a new frontier of mobile technology, **5G promises latency** (the delay users face as data makes a round trip) of just one millisecond compared to 50 milliseconds of a 4G network. The 5G devices will have **low power requirements** that will boost the battery life of devices multiple times. 5G is more than just faster download speeds as with increase in cellular bandwidth, blazing speed and low latency, it promises to **boost the 'Internet of Things'** by making it easy for several devices to connect to each other to communicate and to be controlled remotely. 5G is being rolled out in many places including South Korea, the United States, and Canada, and is expected in India soon.

What will be the future Gs?

- Not a functioning technology as of now, 6G only promises to do better than 5G. Samsung's white paper on 6G published in 2020 ('The Next Hyper-connected Experience for All'), said that "the completion of the 6G standard and its earliest commercialisation date could be as early as 2028, while **mass commercialisation** may occur around 2030".
- **Experts envision future Gs with a communication web with zero lag,** where it will be possible to seamlessly perform remote surgery and even beam sports events live using hologram technology.

- Both humans and machines will be the main users of 6G, and 6G will be characterized by provision of advanced services such as **truly immersive extended reality (XR), high-fidelity mobile hologram** and **digital replica**.



What are the two different modes of 5G networks?

- 5G networks are deployed mainly on two modes: **standalone and non-standalone**.

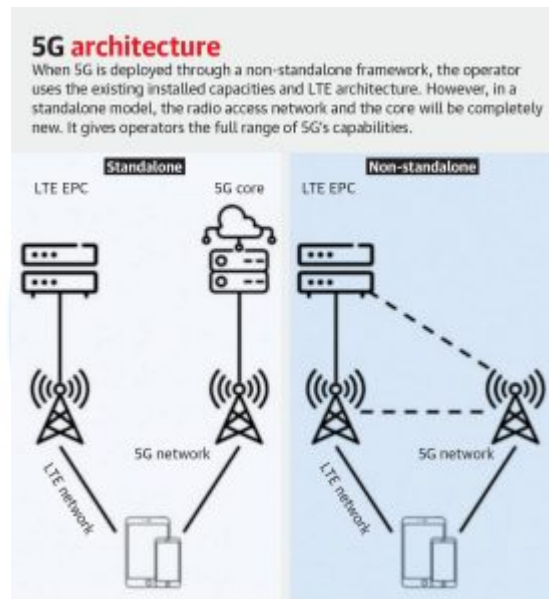
What is the standalone mode of the 5G network deployment?

- In the standalone mode**, which Jio has chosen, the 5G network operates with dedicated equipment, and runs parallel to the existing 4G network.
- Jio has committed an investment of Rs 2 lakh crore for its standalone 5G network.
- The standalone mode provides access to full 5G capabilities and new network functionalities such as **slicing** that provides greater flexibility to operators to efficiently use their spectrum holdings.
- Standalone modes are good for business customers** because it requires high investments that operators would look at designing high-margin offerings.

What is non-standalone mode of the 5G network deployment?

- In Non-standalone mode**, the 5G network is supported by the 4G core infrastructure.
- Non-standalone networks are built on existing infrastructure**, the initial cost and the time taken to roll out services through this track is significantly less than standalone networks.
- Non-standalone networks are generally considered to be a stepping stone, and global precedent suggests operators that have launched non-standalone 5G networks eventually transition to standalone networks.

- Non-standalone mode, however, lets operators maximise the utilisation of their existing network infrastructure with relatively lower investment.
- **Non-standalone networks are more attractive for smartphone** users due to early rollout timelines and low infrastructure costs.
- The biggest difference in the two architectures is the compatibility with existing device ecosystems. Most smartphones today have capability to connect to non-standalone 5G networks — which are essentially 5G airwaves transmitted through 4G networks — and will require software updates by their OEMs to be able to connect to standalone networks.



What is latency and how latency of 5G is different from 4G?

- Latency is the time it takes for a device to send packets of data and get a response. Shorter the latency, quicker the response.
- 5G could have benefits for consumers owing to the superior Internet speed and low latency it promises over 4G. At its peak, Internet speeds on 5G could touch 10 Gbps, compared to the 100 Mbps peak of 4G.
- Similarly, latency under 4G is between 10-100 ms (millisecond) whereas on 5G it is expected to be under 1 ms.

What are the benefits of 5G?

- Speeds and latency levels offered by 5G telephony are the key selling propositions for most industrial use cases such as manufacturing, Internet of Things, artificial intelligence.
- Near-term benefits offered by 5G for consumers are high network performance, relief from urban network congestion, and more home broadband choices.

- A 5G world of the future is billed to have smart city infrastructure, self-driving cars, and robotic surgeries as real-use cases.

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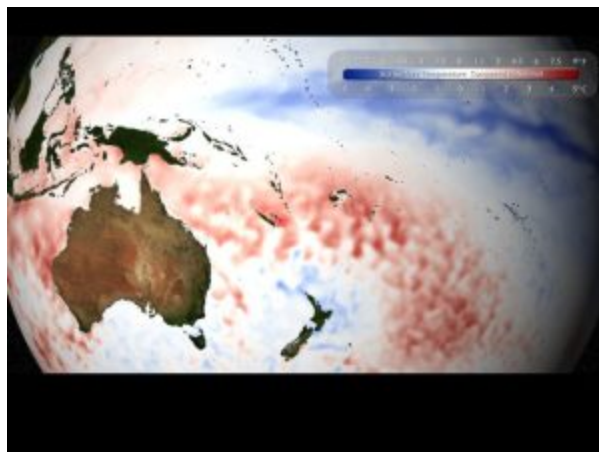
El Niño and La Niña.

GS Paper 1: Important Geophysical phenomena such as earthquakes, Tsunami, Volcanic activity, cyclone etc., geographical features and their location-changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.

News: In what may be termed as an uncommon phenomenon, La Niña conditions prevailing over the equatorial Pacific Ocean since September 2020 have entered the third year. There are only six instances of La Niña lasting for more than two years since the 1950s, data with the India Meteorological Department (IMD) show.

What is La Niña in weather?

- La Niña is a climate pattern that describes the cooling of surface ocean waters along the tropical west coast of South America.
- La Niña is considered to be the **counterpart to El Niño**, which is characterized by unusually warm ocean temperatures in the equatorial region of the Pacific Ocean.
- La Niña **brings warmer-than-normal sea-surface temperatures (in red)** to the southern Pacific Ocean around northern Australia, New Guinea, and the islands of Indonesia.
- The **cooler sea-surface temperatures of La Niña (in blue)** occur in the southern Pacific off the coast of South America.

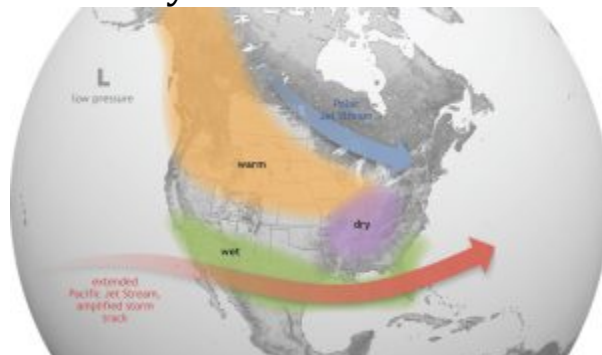


What are the conditions which causes La Nina?

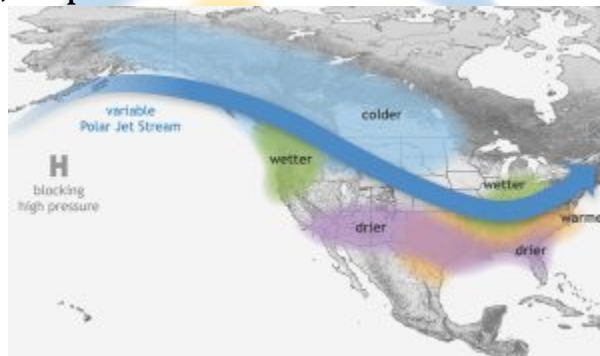
- La Niña is caused by a build-up of cooler-than-normal waters in the tropical Pacific, the area of the Pacific Ocean between the Tropic of Cancer and the Tropic of Capricorn. Unusually strong, eastward-moving trade winds and ocean currents bring this cold water to the surface, a process known as **upwelling**.
- **Upwelling** can cause a drastic drop in sea-surface temperature. Coastal sea-surface temperatures near Ecuador and Peru dropped nearly 4 degrees Celsius (7 degrees Fahrenheit) during the 1988-89 La Niña event.

What are El Niño and La Niña?

- **El Niño:** During El Niño, trade winds weaken. Warm water is pushed back east, toward the west coast of the Americas. El Niño means **Little Boy, or Christ Child** in Spanish. South American fishermen first noticed periods of unusually warm water in the Pacific Ocean in the 1600s. The full name they used was El Niño de Navidad, because **El Niño typically peaks around December**. El Niño can affect our weather significantly. The warmer waters cause the Pacific jet stream to move south of its neutral position. With this shift, areas in the northern U.S. and Canada are dryer and warmer than usual. But in the U.S. Gulf Coast and Southeast, these periods are wetter than usual and have increased flooding.
- **El Niño has a strong effect on marine life off the Pacific coast:** During normal conditions, upwelling brings water from the depths to the surface; this water is cold and nutrient rich. **During El Niño, upwelling weakens or stops altogether**. Without the nutrients from the deep, there are fewer phytoplankton off the coast. This affects fish that eat phytoplankton and, in turn, affects everything that eats fish. The warmer waters can also bring tropical species, like yellowtail and albacore tuna, into areas that are normally too cold.



- **La Niña:** La Niña means **Little Girl in Spanish**. La Niña is also sometimes called **El Viejo, anti-El Niño, or simply “a cold event.”** La Niña has the opposite effect of El Niño. During La Niña events, trade winds are even stronger than usual, pushing more warm water toward Asia. Off the west coast of the Americas, upwelling increases, bringing cold, nutrient-rich water to the surface. These cold waters in the Pacific push the jet stream northward. This tends to lead to drought in the southern U.S. and heavy rains and flooding in the Pacific Northwest and Canada. **During a La Niña year, winter temperatures are warmer than normal in the South and cooler than normal in the North.** La Niña can also lead to a more severe hurricane season. **During La Niña, waters off the Pacific coast are colder and contain more nutrients than usual.** This environment supports more marine life and attracts more cold-water species, like squid and salmon, to places like the California coast.



What is EL Nino Southern Oscillation(ENSO)?

- ENSO is a **series of linked weather- and ocean-related phenomena**. The El Nino-Southern Oscillation (ENSO) is an irregular cycle of change in wind and sea surface temperatures over the tropical eastern Pacific Ocean, affecting the climate of much of the tropics and subtropics. **The warming phase of the sea temperature is known as El Nino and the cooling phase as La Nina.**
- Together, La Niña and El Niño are the “cold” (La Niña) and “warm” (El Niño) phases of the El Nino-Southern Oscillation (ENSO).
- Besides unusually warm or cool sea-surface temperatures, **ENSO is also characterized by changes in atmospheric pressure.**

How does La Nina (El Viejo or cold event) impact India’s monsoon?

- La Nina is observed when the water temperature in the Eastern Pacific gets comparatively colder than normal, as a consequence of which, there is a strong high pressure over the eastern equatorial Pacific.

- The **difference in pressure between Eastern Pacific and Western Pacific/Asia** causes a moisture-laden wind movement from East to West Pacific and Asia.
- As a result, La Nina causes drought in the South American countries of Peru and Ecuador, heavy floods in Australia, high temperatures in Western Pacific, Indian Ocean, off the Somalian coast and a comparatively better monsoon rains in India.

How does El Nino impact India's monsoon?

- The warming in the tropical Pacific Ocean because of El Niño weakens the southeast trade winds flowing to the intertropical convergence zone over India. Since these winds are the main driving force of the Indian summer monsoon, El Niño events are associated with weak monsoons and lower than average rainfall.
- Generally, El Nino and La Nina occur every 4 -5 years. El Nino is more frequent than La Nina.

Sharad

The Change in the Age of consent for a sexual relationship: An analysis

Context: On August 2, in Rama @ Bande Rama v. the State of Karnataka, the Karnataka High Court quashed criminal proceedings of rape and kidnapping under the Indian Penal Code and penetrative and aggravated penetrative sexual assault under the Protection of Children from Sexual Offences (POCSO) Act, 2012 against the complaint made behalf of a minor child by her father.

Introduction

A girl 17 years old had a sexual relationship with her partner of 21 years old with mutual consent but her father filed a case against the boy under the POSCO and other sections of IPC. However, the girl accepted her consent in front of the court but the prosecution argued that there is no significance of the consent of the minor girl and that the punishment should be given to the boy. But Girl argued that she had a marriage after being an adult and had a

child. should it be sent to orphan houses? The honorable high court of Karnataka finally quashed the charges on the boys and also suggested the revival of the minimum age of consent for a sexual relationship

Normalcy of relationships

- In the matter of POSCO, the consensual and non-consensual relationship is just unclear because, in the matter of a Child, the consent of a child is treated as rape also. The consensual sexual relationship in the matter of child is immaterial
- But in some case, the silence of the POSCO act on the consensual relationship adversely impact justice. If the minor children have a sexual relationship with mutually consenting and after being adults, they are married, how the charge of rape should be framed against the boys only?
- In Vijaylakshmi v. State Rep (2021), Madras high court also quashed the charges because the honorable court found that a boy had a sexual relationship with the full consent of the minor girl and she never opposed and even though he was happy with this relationship. Similarly, In the case of Raj Kumar v. State of Himachal Pradesh (2021), the Himachal Pradesh High Court allowed a petition filed by the minor girl's father for quashing the trial against his son-in-law. The honorable court observed if criminal proceedings are allowed to continue, the same will adversely affect the married life of his daughter.
- In another case of Skhemborlang Suiting v. State of Meghalaya (2021), a boy was booked under the POSCO when he brought his wife who was of 17year to the hospital for a checkup after she became pregnant.
- After the analysis by Skhemborlang Suiting v. State of Meghalaya (2021), more than 1700 romantic cases were booked under the POSCO in various states. In these cases, more than 80 % of cases are filed after the complaint by the parents of the girl after the girl went "missing", or eloped with her partner, or the pregnancy was discovered. In some cases the victim and the accused were married

Need for the Law Reform

The high rate of acquittals implies that this law is beyond the social realities. In a modern society or urban society, consensual sexual relationship is very common even between the age of 16- 17. The high court also acknowledged the destructive impact of this law. The minimum age for consensual sex must be revised. It also impacts the delivery of justice as

these cases constitute a large burden on our courts, and divert attention from investigation and prosecution of actual cases of child sexual abuse and exploitation.

Conclusion

As per the above discussion, it can be concluded that the law should be reformed as per the ground social reality. The POSCO act inversely impact justice and many boys are charred under the POSCO even after the marriage. Generally, parents do not file any case if the girl is not pregnant. So in such a situation injustice would be done to the newborn baby. Considering these types of ground realities, the government should reform the laws

Anshul

Borra Caves in Andhra Pradesh

GS Paper 1: Important Geophysical phenomena such as earthquakes, Tsunami, Volcanic activity, cyclone etc., geographical features and their location-changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.



About Borra caves:

- Borra caves are among the deepest and longest caves in India.
- It is located in the **Anantagiri hills of the Eastern Ghats** range in Alluri Sitharama Raju district in Andhra Pradesh.

- The caves created millions of years ago by water activity, mainly by the Gosthani **river**, are a rare geological formation. They are basically **karstic limestone structures** extending to a depth of 80 metres.
- The ancient caves were discovered by the Geological Survey of India in 1807.
- Due to the water activity cutting through rich limestone, many **stalagmites** and **stalactites** have formed over the years.
- According to researchers, the cave is highly valuable for anthropological research, as excavations carried out earlier **unearthed stone tools of middle Paleolithic culture dating between 30,000 and 50,000 years ago**. These findings confirm human habitation in that area.
- One of the major tourist attractions of the region, the caves illuminated with artificial lighting — draw visitors from across India, sometimes crossing 10,000 visitors a day during peak season.



Mechanism for formation of Borra Caves

- Partially decomposed organic matter creates humic acid in the water. When this acidic water reacts with calcium carbonate in limestone, the minerals in the stone get dissolved and the stone disintegrates gradually. As small streams from the hillocks rushed to the Gosthani River below, this chemical reaction kept eroding the stones over a long period of time, leading to the formation of Borra Caves. Had it stopped there, the caves would not have become this famous. The reaction is still going on. Because of the continuing chemical reaction, new shapes keep forming while the old ones change shape.
- Water percolates from the roof of the caves and reacts with calcium bicarbonate and other minerals on the rock forming mound-like structures on the ground called stalagmites and spear-like structures hanging from the roof called **stalactites**.



What are the structures that inspire the viewer's imagination?

- There are sculptures of mother-child, Shiva-Parvati, monkeys, brain, crocodile, rishi's beard, cow's udder and many more.
- At one end of the caves, there is a naturally formed joint that links two huge stones from top to bottom.
- Somewhere deep inside at a point, a plaque informed us that the Kottavasala-Kirandul railway line passes over the caves, exactly at that point. The thickness of the rock at this point is 100 feet.
- There is also a naturally formed Shivling inside the caves, which is worshiped by the tribals who inhabit the forests around.



Sharad