



Former Navy Personnel Sentenced to Death in Qatar

For Prelims: Former Navy Personnel Sentenced to Death in Qatar, [Indian Navy](#), [India-Qatar Relations](#), [International Court of Justice \(ICJ\)](#), United Nations (UN).

For Mains: Former Navy Personnel Sentenced to Death in Qatar, Legal options with India, and its Implications on India-Qatar Relations.

[Source: IE](#)

Why in News?

Recently, a Qatari court has sentenced eight former personnel of the [Indian Navy](#) to death in the Espionage Charges.

- The individuals were arrested in August 2022 and faced **charges related to breaching sensitive secrets.**



What is the Background of the Case?

- **Accusations:**
 - The accused individuals, while employed by **Al Dahra in Doha**, were allegedly accused of breaching sensitive secrets at the time of their arrest in 2022 in **Qatar**.
 - Dahra Global Technologies and Consultant Services, the company they worked for, was

also linked to the production of **advanced Italian-origin submarines known for their stealth capabilities.**

- However the specific charges against the eight Indian nationals have not been made public by **Qatari authorities.**

<h3>Case History</h3> <p>In August 2022, eight Indian nationals – all retired Indian Navy personnel – were arrested by Qatari intelligence</p> <p>Capt Navtej Singh Gill, Capt Birendra Kumar Verma, Capt Saurabh Vasisht, Cdr Amit Nagpal, Cdr Purnendu Tiwari, Cdr Sugunakar Pakala, Cdr Sanjeev Gupta, Sailor Ragesh were working for Al Dahra company</p> <p>Before taking up jobs at Al Dahra, all had retired from Indian Navy several years ago</p>	<p>Initially, they were kept in solitary confinement without clear charges</p> <p>They were charged with spying in Qatar on behalf of Israel</p> <p>Al Dahra was shut down after the arrests</p> <p>Reports said the personnel were working on a project to develop small, stealth submarines for the Qatar Navy</p>	<p>India had secured consular access to the accused and provided legal assistance</p>	<p>Trial started in March this year</p>	<p>Qatari court of first instance has pronounced them guilty and awarded death sentence</p>	<p>India is 'deeply shocked' at the verdict and 'exploring legal options'</p>
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▪ Previous Trials:

- The case has seen two trials in March and June of 2023. While the detainees were granted consular access on multiple occasions, both Indian and Qatari authorities **have maintained a veil of secrecy around the case**, citing its sensitivity.

▪ India's Reaction:

- India has expressed deep shock and concern over the death sentences imposed on its citizens and is exploring all possible legal options to secure their release.
- The **Ministry of External Affairs (MEA)** has conveyed the high importance attached to this case and **reiterated its commitment to providing consular and legal assistance** to the detained individuals.

What are the Diplomatic Implications of this Case?

- The verdict could potentially strain relations between India and Qatar, where a significant number of **Indian migrants contribute to fostering economic and diplomatic ties.**
- With over seven lakh Indians in Qatar, the Indian government is under pressure to act at the **highest level to save the lives of the detainees.**
 - They are making their contribution in different sectors. Indians are highly respected in Qatar for their sincerity, hard work, technical expertise and law-abiding nature.
 - The remittances which the Indian expatriate community in Qatar send to India are estimated to be around 750 million dollar per annum.
- This case represents the **first major crisis in the India-Qatar relationship**, which has generally been stable.
 - The two nations have engaged in high-level meetings, with the Prime Minister of India visiting Doha in 2016, followed by **meetings with the Emir of Qatar.**
- Qatar is a significant supplier of liquefied natural gas (LNG) to India, **accounting for a substantial portion of India's LNG imports.**

What are the Options India has to Prevent these Navy Personnels?

▪ Diplomatic Options:

- India can engage in direct diplomatic negotiations with the Qatari government to seek a resolution to the case. Given the strategic and economic importance of the relationship between the two **countries, diplomatic leverage can play a significant role.**
- The government can also use diplomatic pressure to prevent meting out the death penalty.
- Among the possibilities being looked at is filing an appeal against the verdict or using an **agreement signed by India and Qatar in 2015 for the transfer of convicted prisoners** so that they can **complete their sentence in their home country.**
- NGOs and civil society can raise the **issue at a global level, and pressure from the [United Nations](#)** can be taken too.

▪ Legal Options:

- The first step is to **appeal within the judicial system in Qatar.** The individuals sentenced to death can file appeals within the Qatari legal system.

- India can provide **legal representation to the detainees and ensure that their right to appeal** is pursued vigorously.
- If due procedures are not followed or an appeal process is missing, then India can **invoke [International Court of Justice \(ICJ\) jurisdiction](#)**.
 - ICJ acts as a world court **with two fold jurisdiction i.e.** legal disputes between States submitted to it by them (contentious cases) and requests for advisory opinions on legal questions referred to it by United Nations organs and specialized agencies (advisory proceedings).

In What Cases was India Involved with the ICJ?

- Kulbhushan Jadhav Case (India Vs Pakistan)
- Right of Passage over Indian Territory (Portugal v. India, culminated 1960).
- Appeal Relating to the Jurisdiction of the ICAO Council (India v. Pakistan, culminated 1972).
- Trial of Pakistani Prisoners of War (Pakistan v. India, culminated 1973).
- Aerial Incident of 10 August 1999 (Pakistan v. India, culminated 2000).
- Obligations concerning Negotiations relating to Cessation of the Nuclear Arms Race and to Nuclear Disarmament (Marshall Islands v. India, culminated 2016).

Way Forward

- The way forward is likely to be challenging and may require time and persistence. It's essential for India to remain committed to the **well-being and legal rights of its citizens while navigating the complexities of international diplomacy** and the legal process in Qatar.
- Successful resolution may require a combination of **diplomatic efforts, legal actions, and international cooperation**.

Cloud Seeding

For Prelims: [Cloud Seeding and Types](#), Artificial Rain, Convective Clouds

For Mains: Application of Cloud Seeding and Concerns, Atmospheric Circulation, Water Resources

Source: [TH](#)

Why in News?

Cloud seeding, a groundbreaking technique to enhance rainfall, has taken centre stage in a recent study published in the *journal Bulletin of the American Meteorological Society*, conducted by the **Indian Institute of Tropical Meteorology, Pune**.

- The study unveils the potential of cloud seeding to boost precipitation in water-scarce regions, offering hope for tackling **drought conditions**.

Cloud seeding works if done correctly

Cloud seeding experiments were carried out in Solapur city, which gets less rainfall, from June to September in 2018 and 2019

■ There was 18% increase in rainfall over a 100 sq.km area in Solapur city due to cloud seeding

■ Approximate cost of producing water through cloud seeding was 18 paisa per litre. The cost can drop by over 50% if indigenous seeding aircraft are used

■ 20-25% of cumulus clouds produce rainfall if cloud seeding is done correctly

■ Cloud seeding alone cannot mitigate droughts but can help produce additional rainfall that can partially address water requirements

■ Calcium chloride flare was used for seeding the clouds. The seeding was done at the base of the warm convective clouds and at a time when the clouds were growing

■ The study was carried out for two years to understand the microphysics and characteristics of convective clouds that can be targeted to enhance rainfall

■ The work provides elaborate protocols and technical guidance to plan and conduct cloud seeding in India

Not all:
As microphysics of clouds vary widely, not all clouds produce rainfall through cloud seeding



What are the Key Highlights of the Study?

■ CAIPEEX Phase-4 Investigation:

- The Cloud Aerosol Interaction and Precipitation Enhancement Experiment (CAIPEEX phase-4) was a two-year study in Solapur (Maharashtra), conducted during the 2018 and 2019 summer monsoons.
- Its primary objective was to assess the **effectiveness of hygroscopic seeding in deep convective clouds** and develop a cloud seeding protocol.
 - Researchers used calcium chloride flares for cloud seeding.
 - A cloud seeding flare releases these particles when triggered. The seeding was done at the base of the warm convective clouds and at a time when the clouds were in their growing stage so that the seed particles could enter the clouds with minimum dispersion.
- The experiment employed **two aircraft for cloud parameter study and cloud seeding.**

■ Cloud Seeding's Effectiveness:

- Cloud seeding is proven effective for **enhancing rainfall under suitable conditions.**
- A random seeding experiment selected 276 convective clouds, with 150 clouds subjected to seeding and 122 unseeded.
 - Specific cloud characteristics, including liquid **water content and vertical motion**, were used to identify clouds with potential for rainfall.
 - Targeted convective clouds were typically over one kilometer deep and likely to evolve into deep cumulus clouds.

■ Benefits:

◦ Cost-Benefit Ratio:

- The approximate **cost of producing water through cloud seeding was 18 paisa per liter** during the research experiment.
- Using indigenous seeding aircraft could reduce costs by more than 50%.

◦ Managing Drought Conditions:

- Cloud seeding alone cannot fully mitigate droughts but can contribute to an **18% increase in rainfall, partially addressing water requirements.**
- Undertaking cloud seeding as part of catchment-scale projects could help in drought management.

◦ Practical Applications:

- Cloud seeding can significantly benefit regions like Solapur which falls on the

leeward side of the [Western Ghats](#) and hence gets low rainfall.

- Additional water through cloud seeding has the potential to alleviate water scarcity issues in such areas.

- **Microphysics and Cloud Characteristics:**

- The two-year study aimed to understand the **microphysics and characteristics of convective clouds** suitable for enhancing rainfall.
 - It provides comprehensive protocols and technical guidance for planning and conducting cloud seeding in India.

- **Cloud Variability:**

- Not all cumulus clouds respond to cloud seeding; **approximately 20-25% can produce rainfall** if seeding is executed correctly.
- Cloud microphysics varies widely, leading to varied results with cloud seeding.

Convective Clouds

- **Convective clouds** are clouds that form when **warm, humid air rises** through cooler air in the atmosphere.
 - The warm air is less dense than the surrounding air, so it rises. This process is called **convection**.
 - Convective clouds are also known as **cumuliform clouds**. They look like stacks of cotton balls.
- There are two types of convective clouds: **Cumulus clouds and cumulonimbus clouds**.
 - Cumulus clouds are fluffy, white clouds with a flat base and a rounded top. Cumulus clouds can develop into cumulonimbus clouds, which are associated with thunderstorms.
 - Cirrocumulus Clouds are high-altitude clouds that appear as small, white, and fluffy cloud patches. They often have a wavy or honeycomb-like pattern.

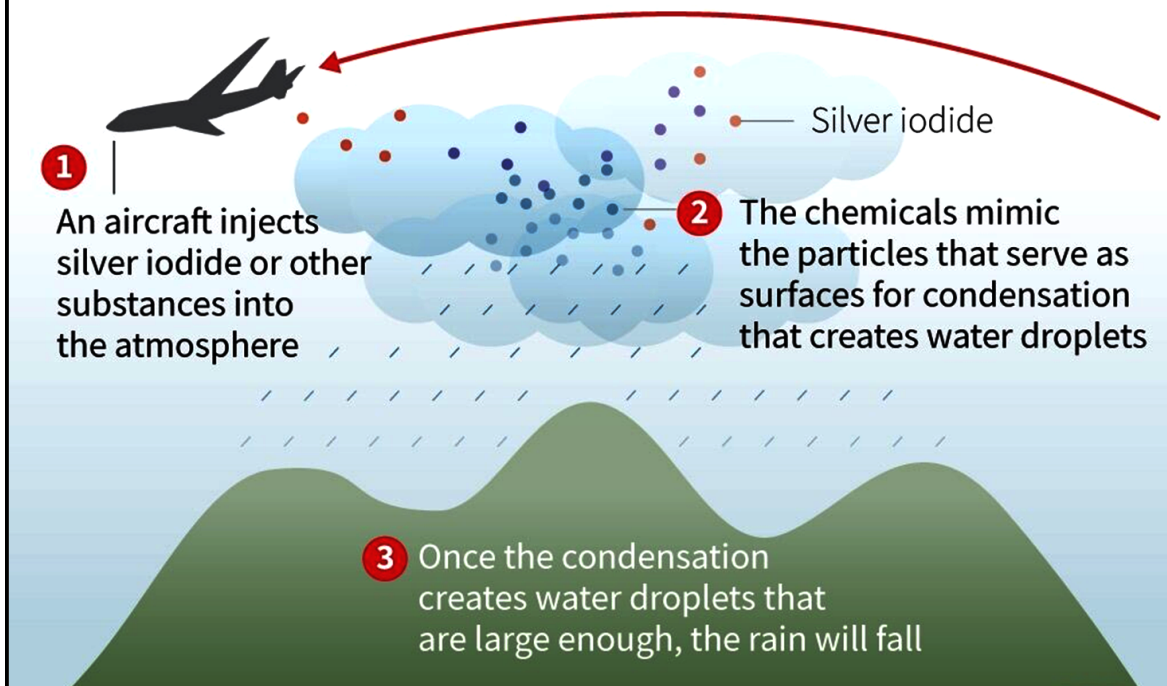
What is Cloud Seeding?

- **About:**

- It is the process of **artificially generating rain** by implanting clouds with particles such as silver iodide crystals.
- Cloud seeding uses planes to spray clouds with chemicals to condense smaller particles into larger rain droplets.

Cloud seeding

Traditional method of rainmaking, in use since the 1940s



▪ Cloud Seeding Methods:

◦ Static Cloud Seeding:

- This method involves **introducing ice nuclei, such as silver iodide or dry ice, into cold clouds** that have supercooled liquid water droplets.
- The ice nuclei can trigger the formation of ice crystals or snowflakes, which can grow at the expense of the liquid droplets and fall as precipitation.

◦ Dynamic Cloud Seeding:

- Dynamic cloud seeding is a method of inducing rain by **boosting vertical air currents**.
 - The process is considered more complex than static cloud seeding because it depends on a sequence of events working properly.

◦ Hygroscopic Cloud Seeding:

- This method involves spraying fine particles of hygroscopic materials, such as **salts through flares** or explosives into the base of warm clouds.
- The particles can act as cloud condensation nuclei and increase the number and size of the cloud droplets, which can enhance the reflectivity and stability of the clouds.

▪ Applications:

- Cloud seeding is done to enhance **winter snowfall and increase mountain snowpack**, which can supplement the natural water supply for communities in the surrounding area.
- Cloud seeding can also be done to prevent hailstorms, dissipate fog, induce rainfall in drought-prone regions, or reduce air pollution.

▪ Challenges:

- Cloud seeding requires the presence of **moisture-filled clouds**, which are not always available or predictable.
- Cloud seeding does not occur during times when **additional precipitation would be problematic**, such as times of high flood risk or busy holiday travel periods.
- Cloud seeding may have negative effects on the environment and health, such as altering the natural water cycle, contaminating the soil and water with chemicals, or affecting the local climate.

Ammonia as a Automotive Fuel

For Prelims: [Ammonia](#), [Battery Electric Vehicles](#), Energy Density of Ammonia, [Haber-Bosch process](#), [Green Hydrogen/ Green Ammonia Policy](#).

For Mains: Advantages and Challenges Related to Ammonia as a Fuel, Scientific Innovations & Discoveries, Conservation

Why in News?

Recently, an **internal combustion engine** powered by [ammonia](#) is gaining traction in the [automotive industry](#).

- This unique approach is sparking interest as it **explores alternative propulsion technologies** while not completely departing from **traditional Internal Combustion Engine (ICE) systems** or transitioning to [Battery Electric Vehicles \(BEVs\)](#).

What are ICE Systems and BEV Systems?

- **Internal Combustion Engine (ICE) Systems:**
 - ICE vehicles use traditional engines that burn fossil fuels (e.g., petrol or diesel) to generate power.
 - **Fuel is mixed with air, ignited**, and the resulting explosion drives the vehicle's wheels.
 - They are commonly found in cars, trucks, and motorcycles.
 - They emit exhaust gases and contribute to air pollution and greenhouse gas emissions.
- **Battery Electric Vehicles (BEVs):**
 - **BEVs** are electric vehicles that rely **solely on rechargeable batteries to power an electric motor**.
 - They must be charged using electricity from the grid, which can be generated from various sources, including renewable energy.
 - They produce **zero tailpipe emissions** and are considered environmentally friendly.

What are the Current Major Applications of Ammonia?

- **About:**
 - **Ammonia** is a chemical compound with the formula NH_3 . It is a colorless gas with a pungent odor and is widely used in various **industrial, agricultural, and household applications**.
- **Major Application:**
 - **Agriculture:** Key component in the **production of ammonia-based fertilizers**, such as ammonium nitrate and urea, which are essential for crop growth.
 - **Chemical Industry:** Fundamental ingredient in the production of substances like **nitric acid, ammonium sulfate, and various nitrogen-based compounds**.
 - It plays a crucial role in the manufacturing of synthetic fibers as well, like nylon
 - **Manufacturing:** As a **refrigerant in industrial refrigeration systems** and air conditioning.
 - Also, ammonia is used in the manufacture of dyes and as a **pH regulator in dyeing processes**.
 - **Household:** An ingredient **in household cleaning products**, including glass and surface

cleaners.

What are the Advantages of Using Ammonia as a Fuel?

- **High Energy Density:** Ammonia has a **high [energy density](#)**, which means it **can store and release a significant amount of energy**, making it suitable for long term applications.
 - Ammonia has **9 times the energy density of [lithium-ion batteries](#)** and 3 times that of compressed hydrogen.
- **Low Carbon Emissions:** Ammonia has the potential to **produce [near-zero carbon dioxide \(CO₂\) emissions during combustion](#)**, making it an environmentally friendly choice, especially when compared to fossil fuels.
- **Bridge Fuel:** Ammonia can serve as a bridge fuel, helping reduce dependence on traditional fossil fuels and offering a **transitional buffer toward [cleaner energy sources](#)**.
 - Also, using ammonia can enhance a **nation's energy security by diversifying the energy mix** and reducing reliance on a single energy source.

What are the Major Challenges Associated with Using Ammonia as a Fuel?

- **Environmental Impact:** Ammonia as a fuel holds the promise of near-zero CO₂ emissions during combustion.
 - But current ammonia engines still emit exhaust gases, including unburned **ammonia and [Nitrogen oxides \(NO_x\)](#)** that pose risks to environment and health.
 - Nitrogen in the atmosphere usually results in **more tropospheric ozone, respiratory illnesses, and acid rain.**
- **Production Challenges:** The production of ammonia typically relies on the **[Haber-Bosch process](#)**, which consumes a significant amount of energy and relies on fossil fuels.
 - **[Green ammonia production](#)**, which involves using renewable energy and sustainable sources of hydrogen, is still in the early stages of development and **faces cost and scalability challenges.**
- **Toxicity:** Ammonia is highly toxic, posing health risks to humans and the environment if not managed properly.
 - Also, due to its **toxicity and corrosiveness**, accidents or mishandling could have severe consequences.
- **Fuel Quality Standards:** Developing and implementing **consistent quality standards for ammonia as a fuel can be complex**, especially when ammonia is produced from various sources or with varying levels of impurities.

Note

The **Ministry of Power, Government of India** has notified the **[Green Hydrogen/ Green Ammonia Policy in February 2022](#)**, which provides various incentives and support measures for the manufacturers of green hydrogen and **green ammonia using renewable power.**

Way Forward

- **Improved Engine Technology:** There is a need to invest in **research and development to create more efficient and cleaner ammonia engines.**
 - This includes optimizing combustion processes and designing engines that can handle ammonia fuel with minimal (NO_x) emissions.
 - **Practical advancements** in engine design can **make ammonia a more viable option.**
- **Safety Training:** Implementing comprehensive training programs for workers involved in the ammonia industry. **Proper handling, safety protocols, and emergency response training** can reduce the risks associated with ammonia's toxicity.
- **Market Incentives:** Creating market incentives, such as tax credits or subsidies, to encourage the adoption of ammonia as a fuel, particularly in sectors where its use can have a significant

positive impact, like [maritime transport](#).

- **Ammonia Hybrids:** Developing hybrid systems that **combine ammonia with other renewable energy sources**, such as solar and wind power.
 - Ammonia can then be used as a fuel during **periods of low renewable energy generation**.

UPSC Civil Services Examination, Previous Year Question

Q1. Consider the following statements: (2019)

1. Agricultural soils release nitrogen oxides into the environment.
2. Cattle release ammonia into the environment.
3. Poultry industry releases reactive nitrogen compounds into the environment.

Which of the statements given above is/are correct?

- (a) 1 and 3 only
- (b) 2 and 3 only
- (c) 2 only
- (d) 1, 2 and 3

Ans: (d)

Q.2 With reference to chemical fertilizers in India, consider the following statements: (2020)

1. At present, the retail price of chemical fertilizers is market-driven and not administered by the Government.
2. Ammonia, which is an input of urea, is produced from natural gas.
3. Sulphur, which is a raw material for phosphoric acid fertilizer, is a by-product of oil refineries.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 2 only
- (d) 1, 2 and 3

Ans: (b)

Sikkim Dam Disaster Raises Concerns for India's Bhutan Hydropower Projects

For Prelims: Teesta-III dam, [Glacial Lake Outburst Flood](#), [National Green Tribunal \(NGT\)](#)

For Mains: Related issues with the Dam Safety, Dams Construction and environmental challenges

[Source: TH](#)

Why in News?

The recent [glacial lake outburst flood \(GLOF\)](#) in Sikkim has washed away the 1200-MW Teesta-III dam.

- The [National Green Tribunal \(NGT\)](#) has issued notices to key stakeholders, including the **National Hydroelectric Power Corporation (NHPC)**, that previously dismissed any GLOF threats.
- The collapse of a dam in Sikkim has raised **concerns over the safety and feasibility of India's hydroelectric projects in Bhutan**, which are vital for meeting the energy needs of both countries.

Why Did NGT Issue Notices to Teesta-III Dam Stakeholders?

- The NGT has summoned three pivotal stakeholders (the Sikkim government, Sikkim Urja Limited (responsible for Teesta-III), and NHPC) to address the situation.
- NHPC had **previously downplayed the risk of GLOFs in the region**.
- In 2014, when NHPC's 520 MW Teesta-IV project faced a challenge to its **environmental clearance**, NHPC, in an affidavit to the NGT, said that projects below **Chungthang (Teesta-III)** faced no threat from GLOFs.
 - Apparently convinced, the NGT dismissed the appeal against Teesta-IV's environment clearance in 2017.

What is the National Green Tribunal (NGT)?

- **About:**
 - NGT is a specialized body set up under the **National Green Tribunal Act, 2010** for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources.
 - NGT has five places of sitting: **New Delhi (principal bench), Bhopal, Pune, Kolkata and Chennai**.
- **Structure:**
 - The Tribunal comprises the **Chairperson, the Judicial Members and Expert Members**.
 - The Chairperson is appointed by the Central Government in consultation with the [Chief Justice of India \(CJI\)](#).
 - A Selection Committee shall be formed by the central government to appoint the Judicial Members and Expert Members.
 - The total number of members in **NGT should not be less than 10 and not more than 20**. Each member holds **office for five years or until they attain the age of 70 years**, whichever is earlier and are not eligible for reappointment.
- **Powers and Functions:**
 - It has the power to hear cases relating to various environmental laws, such as the [Water Act, 1974](#); the [Environment Protection Act, 1986](#); the [Forest Conservation Act, 1980](#); the [Biological Diversity Act, 2002](#); **etc.**
 - It has the power to issue orders, directions or writs for enforcing any legal right relating to the environment or preventing or remedying any environmental damage.
 - It has the power to award relief or compensation to the victims of environmental harm or pollution.
 - It has the power to review its own decisions or orders.

What are the Key Facts about Teesta River and Teesta-III Dam?

- **Teesta River:**
 - [Teesta river](#) is a tributary of the [Brahmaputra](#) (known as **Jamuna in Bangladesh**), flowing through India and Bangladesh.
 - It originates in the **Himalayas** near Chunthang, Sikkim and flows to the south through West Bengal before entering Bangladesh.
 - Originally, the river continued southward to empty directly into the Padma River

(main channel of **Ganga** in Bangladesh) but around 1787 the river changed its course to flow eastward to join the Jamuna river.

- Teesta river water conflict is one of the most contentious issues between India and Bangladesh.
- **Tributaries:** Zemu Chhu, Rangyong Chhu, Rangit River, Lachung Chhu, Chakung Chhu.

The Ganges-Brahmaputra Basin



▪ Teesta-III Dam:

- It is a **hydroelectric project built on the Teesta River** in Chungthang, Sikkim. India. It has an installed capacity of 1,200 MW. The dam was the highest in Sikkim.
- **Impact of the GLOF in Sikkim:**
 - The GLOF that occurred in Sikkim washed away the **1200-MW Teesta-III** and caused severe damage to NHPC projects downstream, including the **510 MW Teesta-V** and the **under-construction 500 MW Teesta-VI**.

How Does Sikkim's Dam Disaster Affect India's Hydropower Projects in Bhutan?

- The Sikkim dam disaster raises significant concerns about the safety and viability of India's ongoing hydropower projects in Bhutan.
- The dam collapse has cast a shadow over two of three India-assisted, under-construction mega hydropower projects in Bhutan — the 1,200 MW **Punatsangchhu Stage-I (Puna-I)** and the **1,020 MW Punatsangchhu Stage-II (Puna-II)** on Punatsangchhu River.
- These projects are part of a **2006 agreement between India and Bhutan to develop 10,000 MW of hydropower by 2020**, which was later **revised to 2027**.
- These projects are expected to **provide cheap and clean electricity to India**, which has a power deficit of about 10%, as well as generate revenue for Bhutan, which earns more than half of its GDP from hydropower exports to India.
- However, **these projects have also faced delays and cost overruns** due to geological challenges, technical issues and environmental concerns.
- Bhutan's Prime Minister, acknowledges the need to reevaluate the geological surveys.

Way Forward

- **Strengthen Safety Protocols:** Enhance safety measures and perform rigorous geological assessments for ongoing and future hydropower projects.
- **Collaborative Efforts:** India and Bhutan should work together to reevaluate geological surveys, possibly with the involvement of international experts.

- **Technical Expertise:** Invest in building technical expertise in addressing glacial lake outburst floods (GLOFs) and incorporate this knowledge into project planning.
- **Environmental Impact Studies:** Conduct comprehensive environmental impact studies for hydropower projects in ecologically sensitive areas like the Himalayas.
- **Regular Review:** Establish a framework for regular reviews and assessments of ongoing projects, ensuring lessons from past incidents are considered.

UPSC Civil Services Examination, Previous Year Question

Q. With reference to river Teesta, consider the following statements: (2017)

1. The source of river Teesta is the same as that of Brahmaputra but it flows through Sikkim.
2. River Rangeet originates in Sikkim and it is a tributary of river Teesta.
3. River Teesta flows into Bay of Bengal on the border of India and Bangladesh.

Which of the statements given above is/are correct?

- (a) 1 and 3 only
- (b) 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

Ans: (b)

One Nation, One Student ID

Source: IE

Why in News?

Recently, several state governments requested schools to seek parental consent for the creation of a **new student identity card known as the Automated Permanent Academic Account Registry (APAAR)**.

- This is part of the **'One nation, One Student ID'** initiative of the Union government, stemming from the **[new National Education Policy of 2020](#)**.

What is the Purpose of APAAR, the ID for Students?

- **About:**
 - Under the initiative, each student would get a **lifelong APAAR ID**, making it easy for the **learners, schools, and governments to track academic progress** from pre-primary education to higher education.
 - APAAR would also serve as a gateway to **Digilocker**, a digital system where students can store their important documents and achievements, such as exam results and report cards.
- **Need For Introduction:**
 - The goal behind introducing APAAR is to make **education hassle-free and reduce the need for students** to carry physical documents.
 - The vision is to create a positive change, **allowing state governments to track literacy rates, dropout rates, and more**, helping them make improvements.
 - APAAR also aims to **reduce fraud and duplicate educational certificates** by providing

a single, trusted reference for educational institutions.

How Will the APAAR ID Work?

- **Linkage with the Academic Bank Credit (ABC):**
 - Every individual will have a unique APAAR ID, which will be linked to the [Academic Bank Credit \(ABC\)](#), which is a digital storehouse that contains information of the credits earned by students throughout their learning journey.
- **Change of Schools:**
 - If the student changes schools, whether within the state or to another state, all her data in the ABC **gets transferred to her new school just by sharing the APAAR ID.**
 - Students **won't need to provide physical documents** or transfer certificates.
- **Enrolment for APAAR:**
 - To sign up for APAAR, students will have to provide basic information such as name, age, date of birth, gender, and a photograph. This information will be verified using their **Aadhar number.**
 - Students will need to sign a consent form, and **they can choose to either accept or decline sharing their Aadhar number and demographic information** with the Ministry of Education for creating the APAAR ID.
 - For minors, parents will have to sign the consent form, allowing the Ministry to use the student's Aadhar number for authentication with **UIDAI.**
 - Registration for creating an APAAR ID is **voluntary, not mandatory.**

What are the Concerns Surrounding APAAR?

- **Issues of Privacy:**
 - Parents and students have concerns about sharing their Aadhar details because they worry that their personal information could be leaked to outside parties.
- **Concerns with UDISE+:**
 - The government says that the information shared by students **will be kept confidential** and will not be shared with any third party except for entities engaged in educational activities, such as the [Unified District Information System for Education Plus \(UDISE+\)](#) database.
 - But there are **no laid down guidelines** for UDISE+ to strictly adhere to in order to prevent any breach of data.

United Information System for Education Plus (UDISE+)

- It is **one of the largest Management Information Systems on school education.** It was launched in 2018-2019 to speed up data entry, reduce errors, improve data quality and ease its verification.
- It is **an application to collect the school details** about factors related to a school and its resources.
 - It is an **updated and improved version of UDISE, which was initiated in 2012-13** by the Ministry of Education.
- It **covers more than 1.49 million schools, 9.5 million teachers, and over 265 million students.**
- It helps **measure the education parameters from classes 1 to 12** in government and private schools across India.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Which of the following provisions of the Constitution does India have a bearing on Education? (2012)

1. Directive Principles of State Policy
2. Rural and Urban Local Bodies
3. Fifth Schedule
4. Sixth Schedule
5. Seventh Schedule

Select the correct answer using the codes given below:

- (a) 1 and 2 only
(b) 3, 4 and 5 only
(c) 1, 2 and 5 only
(d) 1, 2, 3, 4 and 5

Ans- (d)

India Begins Producing Reference Fuel

Source: ET

Why in News?

India has marked a significant milestone in its pursuit of self-reliance, **initiating the production of 'reference' grade petrol and diesel**. It holds the promise of not only catering to domestic requirements but also tapping into the export market.

- Historically, only a select few companies, primarily from Europe and the US, provided reference fuels to India.

What is Reference Fuel?

- **About:**
 - **Reference fuels (petrol and diesel)**, represent high-value premium products specifically utilized for **calibrating and testing vehicles by automotive original equipment manufacturers (OEMs)** and institutions engaged in automotive testing and certification.
- **Features:**
 - They have **higher specifications than regular or premium fuels**. It includes various specifications such as Cetane number, flash point, viscosity, sulfur and water content, hydrogen purity, and acid number.
 - For instance, reference grade petrol and diesel feature an **octane number of 97**, exceeding the octane numbers of regular and premium fuels, which stand at 87 and 91, respectively.
- **Indigenous Production by Indian Oil Corporation:**
 - India historically depended on imports to fulfill the need for these specialized fuels. However, the **Indian Oil Corporation (IOC)** has now indigenously developed 'reference' grade **petrol at its Paradip refinery in Odisha and diesel at its Panipat unit in Haryana**.
 - Reference gasoline (petrol) fuels will be available in **E0, E5, E10, E20, E85, E100** from Paradip refinery.
 - Reference diesel fuel shall be available in **B7 grade** from Panipat refinery.

- **Benefit:**
 - **Cost Advantage:** The cost of the imported 'reference' fuel stands between **Rs 800-850 per litre**, whereas the domestic production is estimated to lower the cost to around Rs 450 a litre, signifying a substantial cost advantage.
 - **Benefit to Vehicle Manufacturers:** This development will provide minimum lead time for vehicle manufacturers, enabling import substitution at a better price.

Note

- **E0, E5, E10, E20, E85, E100** refer to different ethanol-gasoline blends. **Ethanol blending** is the process of mixing ethanol with gasoline to create various ethanol-gasoline blends. This blending is aimed at reducing the overall carbon footprint and emissions from gasoline-powered vehicles.
- Diesel B7 is a fuel with added **biocomponents of up to 7%**
- **Octane Number:**
 - It measures the **fuel's resistance to engine knocking**. Higher octane numbers signify better resistance to premature combustion in gasoline.
- **Cetane Number:**
 - Indicates the **ignition quality of diesel fuel**. A higher cetane number signifies easier ignition.
- **Flash Point:**
 - It is the lowest temperature at which a substance produces enough vapor to ignite momentarily.
- **Viscosity:**
 - Measures a **fluid's resistance to flow**; higher viscosity indicates thicker, less fluid-like behavior.
- **Acid Number:**
 - It is a measurement of the amount of acidic substance in the oil.

Thallium Poisoning

[Source: TH](#)

Why in News?

Recently multiple family members in Mahagaon village, Maharashtra fell victim to **thallium poisoning**, a chemical that operates in silence, evading detection.

What are the Key Facts about Thallium?

- **About:**
 - Thallium(Tl) is a chemical element with the **atomic number 81**, was discovered by **Sir William Crookes in 1861**.
 - It is a soft, heavy, inelastic metal.
 - Thallium is **tasteless and odourless** and has been used by murderers as a difficult-to-detect poison.
- **Appearance:**
 - A soft, silvery-white metal that tarnishes easily.
- **Sources:**
 - It is found in trace amounts in the **earth's crust**.
 - It is found in **several ores**. One of these is pyrites, which is used to produce sulfuric acid. Some thallium is obtained from pyrites, but it is mainly obtained as a by-product of copper, zinc and lead refining.

- **Uses:**
 - Thallium's utilization is **restricted due to its toxic nature**.
 - Thallium sulfate, once a **rodent killer**, is now banned for household use in many developed nations.
 - It finds application in the electronics industry for **photoelectric cells**.
 - Thallium oxide is used to create high-refraction glass and low-melting glass.
 - It is also used in the manufacturing of low temperature thermometers, and imitation jewels.
 - **Health Hazards:**
 - Thallium can damage the nervous system causing headaches, weakness, and irritability. Repeated exposures can cause tremors, hallucinations, coma and death.
 - **Antidote:**
 - **Prussian blue** is used in non-radioactive thallium poisoning.
-

Internal Structure of Mars

[Source: TH](#)

Why in News?

According to a pair of recent studies published in Nature, [Mars's](#) liquid iron core is likely to be surrounded by a fully molten silicate layer.

- Data from three years of quakes in Mars, including two seismic events caused by meteorite impacts, were used for the study.
- NASA's [InSight Mars Lander](#) used an instrument called the **Seismic Experiment for Interior Structure (SEIS)** to record seismic waves passing through Mars's interior.

What are the Key Findings of the Study?

- **Mars's Core Composition:**
 - In 2021, measurements from NASA's InSight lander's SEIS project indicated the presence of a **large, low-density core in Mars, comprising liquid iron and lighter elements like sulphur, carbon, oxygen, and hydrogen**.
 - However, two recent studies challenge this finding. They found that the **Martian core is surrounded by a 150 km-thick layer of near-molten silicate rock**, indicating a **higher core density** than previously thought.
- **Misinterpretation of Core Surface:**
 - The studies reveal that the top of this silicate layer **was initially misinterpreted as the core's surface**. This reinterpretation implies that Mars's core is more compact than earlier estimates, aligning better with existing knowledge of chemical abundances on Mars.
 - This revised understanding suggests that **Mars may have had a turbulent interior following its formation, with temperatures reaching at least 2,000 Kelvin**, rather than a calmer, heat-shedding process into interplanetary space.
- **Impact on Mars's Geological History:**
 - The findings have significant implications for Mars's geological history, **hinting at a more dynamic and energetic early phase**. The presence of a molten silicate layer implies a vigorous and turbulent interior, possibly affecting Mars's geological evolution and the distribution of elements within the planet.

What is InSights Mars Lander?

- **About:**
 - **InSight** (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport)

was sent on a **24-month mission in 2018**.

- InSight will study the **interior of Mars**.
 - The landing site is **Elysium Planitia** (a flat-smooth plain just north of the equator considered to be the perfect location from which to study the deep Martian interior), where InSight can stay still and quiet all through.
- **Functions:**
- Mars InSight's goal is to **listen for quakes and tremors** as a way to unveil the Red Planet's inner mysteries.
 - The mission seeks to **answer critical questions about rocky planet formation** in the early days of the solar system.

What are the Various Mars Missions?

- NASA has a [lander \(Mars Insight\)](#), [two rovers \(Curiosity and Perseverance\)](#), and three orbiters (Mars Reconnaissance Orbiter, Mars Odyssey, MAVEN)
- [ExoMars rover \(2021\) \(European Space Agency\)](#)
- [Tianwen-1: China's Mars Mission \(2021\)](#)
- [UAE's Hope Mars Mission \(UAE's first-ever interplanetary mission\) \(2021\)](#)
- [India's Mars Orbiter Mission \(MOM\) or Mangalyaan \(2013\)](#)
- Mars 2 and Mars 3 (1971) (Soviet Union)

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q1. "The experiment will employ a trio of spacecraft flying in formation in the shape of an equilateral triangle that has sides one million kilometres long, with lasers shining between the craft." The experiment in question refers to (2020)

- (a) Voyager-2
- (b) New Horizons
- (c) LISA Pathfinder
- (d) Evolved LISA

Ans: (d)

Q2. Consider the following statements: (2016)

The Mangalyaan launched by ISRO

1. is also called the Mars Orbiter Mission.
2. made India the second country to have a spacecraft orbit the Mars after USA
3. made India the only country to be successful in making its spacecraft orbit Mars in its very first attempt.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: c

Rapid Fire Current Affairs

Exercise KAZIND-2023

Indian Army and [Indian Air Force](#) contingent departed for [Kazakhstan](#) to participate in the **7th edition of Joint Military 'Exercise KAZIND-2023'**.

- The exercise will occur in **Otar, Kazakhstan from 30th October to 11th November, 2023.**
- The exercise between India and Kazakhstan began as "**Exercise PRABAL DOSTYK**" in 2016. After the second edition, it was renamed "**Exercise KAZIND**" and upgraded to a company-level exercise. This year, it was further upgraded to a **bi-service exercise with the inclusion of the Air Force component.**
 - In this edition, both sides will practice counter-terrorism operations in a sub-conventional environment under a [United Nations](#) mandate.

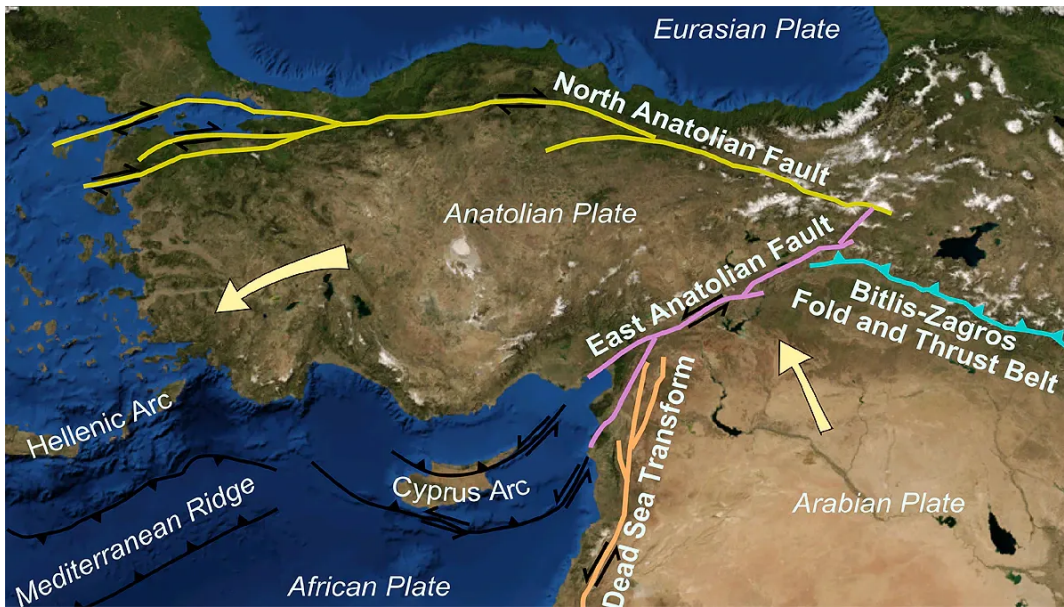


Read more: [KAZIND-2022](#)

Causes of the 2023 Turkey-Syria Earthquakes

A recent study published in the journal Science sheds light on the catastrophic [earthquakes](#) that struck [Turkey and Syria in February 2023](#). These earthquakes, with unprecedented scale and destruction, have prompted a closer look at the intricate interplay of **tectonic forces**.

- Earth's crust is divided into [tectonic plates](#), where **fault lines** form due to interactions such as **collisions, separations, or sliding.**
 - The **East and North Anatolian Fault Lines**, stretching over 700 km and 1,500 km, played a significant role in the Turkey earthquakes.
- During the earthquakes, the conversation between the fault lines was interrupted by a seismic cascade (chain reaction of **ruptures or movements in the Earth's crust** that occurred during the earthquakes). Leading to a much bigger rupture than anticipated and causing extensive damage.
- These findings underscore the unpredictable nature of seismic events and reveal shortcomings in enforcing building codes to **prevent disaster in earthquake-prone regions.**



Read more: [Earthquakes in Turkey and Causes](#)

Dark Pattern Sales by Airlines Deemed 'Cybercrime'

The [Ministry of Civil Aviation](#) has directed its attention towards contentious practices observed within airlines and online travel agencies identified as "[dark patterns](#)", a matter raising **potential cybercrime concerns**.

- This has triggered a significant **influx of consumer complaints, leading to government involvement**. Specifically, the government has called upon major carrier **IndiGo** to rectify deceptive online practices related to seat selection and additional fees.
- Dark patterns are manipulative design strategies used in websites or apps. They are **crafted to trick or push users into doing things they might not want to do**.
 - These can include hidden fees, misleading buttons, or confusing layouts, all aiming to make users take actions that benefit the company, not the user.

Read more: [Dark Patterns](#)

PFRDA's Mandatory Penny-Drop Verification for NPS

The [Pension Fund Regulatory and Development Authority \(PFRDA\)](#) has introduced **mandatory 'penny drop' verification for National Pension System (NPS)** subscribers, ensuring timely fund transfers during withdrawals.

- The **penny drop verification process** involves **Central Recordkeeping Agencies (CRA)** verifying the **active status of the savings bank account** and cross-referencing the name in the account with the subscriber's **Permanent Retirement Account Number (PRAN)** or submitted documents.
- The verification success, inclusive of name matching, is vital for **processing exit/withdrawal requests** and modifying subscriber bank account details.
 - Failure in the penny drop verification prohibits any such requests, prompting CRA to collaborate with nodal offices for rectification.

Read more: [National Pension System](#)

