

INTERSTATE RIVER WATER DISPUTE❖ **Rule Curve for Mullaperiyar**❖ **What is the Rule Curve?**

- Rule Curve is a tabulation which specifies quantum of storage of water or empty space to be maintained in a reservoir during different times of a year, based on the rainfall data for 35 years.
- It is a ready-reckoner in decision-making for officials in charge of the dam, for smooth operation of shutters, especially for moderation of flood, during monsoon times without having to seek permission from the top hierarchical ladder.

❖ **First dam to have Rule Curve**

- According to Tamil Nadu Water Resources Organisation, Mullaperiyar is the first reservoir to have Rule Curve implemented, in the country.
- Water of the Mullaperiyar dam, has remained a bone of contention between Tamil Nadu and Kerala for over four decades. After a long legal battle, the Tamil Nadu Government was allowed by Supreme Court to raise the water level from 136 feet to 142 feet in 2014. However, Kerala insisted with the Supreme Court to insist that Tamil Nadu, which maintains and operates the dam, prepare a Rule Curve for flood control and flood management.
- It had earlier alleged that sudden and unannounced release of flood water through Mullaperiyar dam caused severe damage to Kerala. Though Tamil Nadu Government delayed it with various reasons, it prepared the draft Rule Curve for the reservoir in consultation with Hydrology Wing of the Central Water Commission. And it was first implemented in October 2021. Water was released from the dam much before it could touch 142 feet, raising a huge hue and cry among the farmers and politicians of the State.

❖ **Restriction of water level**

- The Rule Curve comes into effect between June 10 and November 30, during which the dam gets maximum inflows from the South West Monsoon.
- The upper limit of the water level has been fixed for every block period of 10 days of each month based on 35 years of data on water inflow and irrigation pattern. It has been fixed between 136 feet starting June 10 to 142 feet in September 20. Then again, the upper limit is reduced from September 30 and then gradually raised to the maximum permissible level of 142 feet by November 30.
- The fear of Tamil Nadu is that Kerala is indirectly trying to restrict it from maintaining the water below the maximum level of the 142 feet permitted by the Apex Court, in the reservoir which has 152 feet as the full reservoir level and to dissolve the sub-committee formed under the Supreme Court's direction to monitor the dam safety.
- As a result of implementation of the Rule Curve, Tamil Nadu will have to keep the water level below the permitted maximum level of 142 feet for 150 days in a year, the period when the dam gets heavy inflows.

❖ **Unique problem**

- Mullaperiyar dam has the unique limitation of lesser head sluice discharge (withdrawal of water from the dam through tunnel towards Tamil Nadu side) with a maximum discharge capacity of 2,300 cusecs.
- This is minimum in comparison to the dam's maximum flood design of 1.24 lakh cusecs. In 2017, the dam received 30,000 cusecs of inflow.
- Surplus water is released towards Idukki district of Kerala through shutters.
- Eventually, the Rule Curve implementation over the years would be used by Kerala Government, citing the age of the reservoir, in disallowing Tamil Nadu's efforts to further increase the water level to 152 feet upon taking up strengthening works of the Baby dam.

❖ **Stake-holders not consulted**

- While the FRL of the reservoir is 152 feet, calculating the Rule Curve with 142 feet as the base has reduced the maximum water storage in the dam during monsoon time.
- Normally, water yield from the rainfall would fill up Mullaperiyar dam three times in a normal year and five times in a good year. Consequent to implementation of Rule Curve, the limitation in head sluice would force Tamil Nadu to part away with a huge quantity of water to Kerala during floods.
- The preparation of Rule Curve was not done in consultation with the stakeholders, claimed the farmers of Tamil Nadu who benefit from the waters for irrigation.

❖ **Deficit Periyar-Vaigai basin**

- Periyar-Vaigai basin being a rainfall deficit basin is able to produce foodgrains making use of Mullaperiyar dam water. Any attempt to reducing the quantum of water flowing to Periyar-Vaigai basin through implementation of Rule Curve will be a great disservice to the nation, the farmers of the region say.
- In contrast to general fact that the width of rivers widen as they progress towards the sea, the width of Vaigai river shrinks in Ramanathapuram district as it goes closer to the Bay of Bengal. This only indicates the hard truth of Periyar-Vaigai basin being a rain deficit basin.
- In other words, under the Rule Curve method, water is not allowed to be stored to the permissible maximum level at the time when the reservoir receives huge inflows. And permitting Tamil Nadu to maintain it at 142 feet after the monsoon, when there will be little or no inflow, would defeat the very direction of Supreme Court allowing Tamil Nadu to increase the water level to 142 feet, farmers argue.

HEALTH

❖ **Polio to Covid-19: What accounts for India's vaccination success story?**

❖ **CONTEXT: India's success with immunization is an achievement not only for the country but also for the world. India has consistently contributed to the global Sustainable Development Goals (SDGs) by focusing on the immunization of newborns, infants, children, and pregnant women. Under its Universal Immunization Programme (UIP), India provides vaccines against 11 diseases nationally and one disease sub-nationally, targeting close to 2.7 crore newborns and 2.9 crore pregnant women every year.**

- Vaccination is one of the most cost-effective public health interventions, which saves lives by protecting people, especially children, from dreadful vaccine preventable diseases. Since the discovery of the smallpox vaccine over two centuries ago, vaccines have effectively reduced the burden of diseases such as polio, measles, tetanus, whooping cough, influenza, and lately, Covid-19. A recent study in the medical journal The Lancet estimates that vaccines have prevented up to 3.7 crore deaths in the last 20 years in low- and middle-income countries alone.
- Vaccines also have economic and social benefits. A study published in Health Affairs estimated that for every rupee invested in immunization against 10 pathogens in LMICs from 2021-30, the return on investment will be 52 rupees.

❖ **From polio to Covid-19**

- India has a long history of successful vaccination with historical accounts of inoculation dating back to the 18th century. After being declared smallpox-free in 1977, India launched the Expanded Programme on Immunization (EPI) in 1978, and introduced the BCG, DPT, and OPV vaccines. Since then, India's immunization programme has steadily improved in reach and the arsenal of childhood vaccines provided under its umbrella.
 - Newer vaccines, better infrastructure, and innovative strategies to improve both demand and supply of vaccines have been integral components of programme expansion. Along with a government-driven eradication plan, a multi-faceted communication approach helped the entire population achieve public ownership to be polio-free in 2014.
 - Since 2014, immunization activities have been intensified with catch-up rounds such as Mission Indradhanush to ensure that full immunization coverage of >90% is achieved and sustained across the country. In 2016, India became the first country in Asia to launch the Rotavirus vaccine under the UIP. And in 2017, the Pneumococcal Conjugate Vaccine (PCV) was introduced and scaled up using Made-in-India vaccines to prevent rotaviral diarrhoea and pneumococcal pneumonia in children.
 - PCV produced in India costs around Rs 200 per dose, making it affordable and accessible to protect young children from pneumococcal pneumonia in India and other parts of the world. Despite the Covid-19 pandemic, the vaccine was scaled up to all states of the country in 2021. Additionally, the introduction of the pentavalent vaccine in the routine vaccination provides protection against five diseases with no added infrastructure costs and fewer missed doses for individual vaccines.
 - Data from the National Family Health Surveys (NFHS) provide direct evidence of India's success: childhood vaccination rates have consistently improved over the last two decades with the proportion of children who are 'fully vaccinated' reaching 76% as per the latest 2019-21 survey. As India and the world set themselves up to eliminate measles by achieving a sustained vaccination coverage of 95%, the data from India look promising.
 - Measles vaccination rates have increased from 59% in 2006 to 88% in 2021. Mass immunization campaigns have prevented tens of thousands of measles deaths in children. India launched an ambitious Measles-Rubella (MR) vaccination drive and vaccinated over 3 crore children in three years. All the diseases prevented, and lives saved also translate into economic and social benefits.
 - India has achieved remarkable feats with childhood vaccination, and continues to do so with Covid-19 vaccination. India has overcome challenges across time and geography to reach much of its population, ensure last-mile delivery, finance a sustained large-scale operation at the government level, and develop and sustain trust among the people.
 - During the pandemic, lockdowns led to disruptions in routine immunization services and the closure of health facilities. And while we saw global collaboration to bring out vaccines at an unprecedented speed, we also saw 'infodemic-fueled' vaccine hesitancy in people who previously trusted vaccines.
 - Sustained vaccination services, along with cultivating continued vaccine trust and basic knowledge of vaccine benefits in the general population, has helped prevent outbreaks of vaccine-preventable diseases such as measles and polio that are being seen in some parts of the world. Use of technology like the Electronic Vaccine Intelligence Network (eVIN) system that digitizes the entire vaccine stock management, their logistics and temperature tracking at all levels of vaccine storage from national to the sub-district, further ensures vaccine availability and vaccine safety.
- ❖ **Behind India's success**
- ❖ **What accounts for India's success?**
- One, since Independence, India has built up its biomedical enterprise including research and development, and manufacturing capacity. A fruitful public-private partnership has helped bolster this development. The indigenously produced Rotavirus and PCV vaccines, and the speed with which India was able to indigenously produce two Covid-19 vaccines, are examples of the return on these investments.
 - India also built its delivery infrastructure by establishing cold chain systems, and by developing and training a community health cadre of workers who established last-mile services.

- Today, India is the single largest producer of vaccines in the world, providing quality vaccines at low cost, and helping immunize other LMICs. It is estimated that almost two-thirds of the children in the world receive at least one vaccine manufactured in India.
- Two, the infrastructural developments were accompanied by an improvement on the demand side through social and behavioural communication campaigns.
- Such campaigns target all segments of the population to generate awareness about vaccine-preventable diseases and build trust and confidence in vaccinations.
- India uses various available platforms of communication to convey consistent and accurate information. Community health workers such as ASHAs and Anganwadi workers go door-to-door to provide information and identify the missed-out children and pregnant women for any due dose. They have been a cornerstone of the polio endgame through their role in vaccination and active surveillance.
- While national leaders and celebrities spreading messages through mass media has proven to be useful, engagement with local community influencers who are “closer” to people has also tremendously helped build vaccine confidence. As media outlets proliferated, the government incorporated dissemination through new channels such as mobile messaging and social media as part of its evolving communication strategy.
- Despite multiple challenges, vaccination is indeed one of India’s public health success stories. As the world aims to bring about improved uptake of, and equity in Covid-19 vaccination, policymakers and public health practitioners can learn from India’s vaccination programmes. Advocacy, capacity building, investment in research and manufacturing, community engagement, mass- and social-media engagement, and social mobilization have helped India reach its current vaccination coverage.

PRELIMS

1. Naval muscle and seal of Chhatrapati Shivaji, inspiring Indian Navy

❖ **CONTEXT:** Prime Minister Narendra Modi unveiled the Indian Navy’s new Ensign (Flag) at the commissioning of INS Vikrant in Kochi. The new Naval Ensign bears the seal of Chhatrapati Shivaji Maharaj, whose navy gave his enemies sleepless nights, and which the Indian Navy will now fly proudly in the sky and on the seas, the Prime Minister said.

❖ **The new Naval Ensign**

- The new Ensign has the national flag on the upper canton (top left corner), and a blue octagon encompassing the National Emblem sitting atop an anchor. The anchor, depicting steadfastness, has been superimposed on a shield inscribed with the Navy’s motto, Sam No Varunah, in Devanagari.
- The octagonal shape represents the eight directions, symbolizing the Navy’s multi-directional reach and operational capability. The octagon, with a golden double border, has been inspired by the Raja Mudra — seal — of the Maratha emperor Shivaji, which was adopted when he was only 16 years old.
- The new Naval Ensign has replaced the one that carried the Saint George’s Cross with the Tricolour in the canton. That Ensign was essentially a successor to the pre-Independence ensign of the Indian Navy which had the red George’s Cross on a white background with the Union Jack of the United Kingdom on the top left corner.



❖ **Marathas and Indian Navy**

- The Indian Navy has always acknowledged the sea-faring prowess of the Maratha empire under Shivaji and later. It has named a training establishment in Lonavla as INS Shivaji, and a shore-based logistics and administrative hub of the Western Naval Command, Mumbai, as INS Angre — after Kanhoji Angre (1669-1729), the celebrated Maratha naval commander.

• The use of the octagonal design of the seal of Shivaji on the new Naval Ensign is a formal stamp on the umbilical ties of the Indian Navy with the navy of the Maratha empire. Says an Indian Navy document: “The navy under Shivaji was so strong that the Marathas could hold their own against the British, Portuguese and Dutch. Shivaji realised the importance of having a secure coastline and protecting the western Konkan coastline from the attacks of Siddis’ fleet”.

❖ **The navy of Shivaji**

- Shivaji’s empire reached the west coast after 1656-57, when his dominions touched Kalyan. In the same year, he decided to establish a navy in order to protect his territory from the Siddis, and to secure ports and merchant ships in order to ensure smooth maritime trading that brought in revenue and customs duty. His vision for establishing a naval wing of his military was based in his belief in “Jalameva yasya, balameva tasya”, which translates as “He who rules over the seas is all powerful”.

- Between 1661 and 1663, the naval wing of the Maratha empire came into existence, and at its peak included 400-odd ships of various kinds and sizes. These included both battleships and other vessels of varying shapes and purposes, such as gurab, tarande, galbat, shibad, and pal.
- According to B K Apte's pioneering A History of the Maratha Navy and Merchantships, Shivaji's navy tasted its first success when he used 85 ships to attack Basuru near Kundapura in today's Karnataka, and returned with a huge booty. Shivaji also ordered the construction of the naval fort, the Vijaydurg, the twin to Sindhudurg fort, in 1653. Between 1653 and 1680, Shivaji built more naval forts such as Sindhudurg and Kolaba. Many of the forts remained unconquered and were used by the Marathas for strategic purposes, to keep a watch on enemies approaching via the seas. North Konkan's Kalyan and Bhivandi, which were part of the Bijapur territory, came under Shivaji's control by 1657.
- The Maratha navy continued to be a formidable force even after Shivaji, led by admirals such as Angre. The Maratha empire fought the Mughals, the Dutch, and the English at sea, and held its own against all of them.

2. India's most endangered canid- The Dhole

❖ **CONTEXT: As per studies, limited knowledge about the life history of endangered species is a common obstacle in addressing conservation challenges. One such enigmatic species under threat is the forest-dwelling, social canid of Indian forests — the dhole (Cuon alpinus).**

- Geographic Range: From the Altai Mountains in Manchuria in Central and Eastern Asia, its range spreads southwards through the forest tracts of India, Burma, and the Malayan Archipelago. Three races of the dhole exist in India alone.
- Habitat: Dholes like open spaces and can often be found on jungle roads, river beds, jungle clearings, and paths, where they rest during the day.
- The dhole is a highly social animal, living in large clans without rigid dominance hierarchies and containing multiple breeding females. Such clans usually consist of 12 individuals, but groups of over 40 are known.
- The dhole is protected under Schedule 2 of the Wildlife Protection Act, 1972.
- The creation of reserves under Project Tiger provided some protection for dhole populations sympatric with tigers.
- In 2014, the Indian government sanctioned its first dhole conservation breeding centre at the Indira Gandhi Zoological Park (IGZP) in Visakhapatnam.
- It is listed as Endangered by the IUCN, as populations are decreasing and estimated at less than 2, 500 adults.
- Factors contributing to this decline include habitat loss, loss of prey, and competition with other species, persecution, and disease transfer from domestic dogs.
- India, the country with the world's largest population of wild tigers, is perhaps the dhole's safest bet. India purportedly hosts the largest number of dholes in the world.
- Yet, the species has disappeared from ~60% of its historic range in the country in the past 100 years.
- Primarily spread across three landscapes — the Western Ghats, Central India and the North East — the dhole populations in the tropical semi-deciduous forests of central India form a critical stronghold for the species.

Wild Canids–India Project :

- The Wild Canids–India Project was launched in 2018 by researchers affiliated with various organizations/universities.
- The project aimed to conduct research work to better understand wild canids and formulate science-based strategies including citizen science projects to conserve them.

3. Rainbow clouds

❖ **CONTEXT: Recently, an unusually-shaped rainbow cloud appeared over China. The cloud in question resembles a pileus cloud, and the phenomenon of bright colours appearing on a cloud is called cloud iridescence.**

❖ **What is a pileus cloud?**

- A pileus cloud is usually formed over a cumulus or cumulonimbus cloud.
- It is formed when the base cloud pushes a moist current of air upwards and the water vapour from the current condenses to somewhat resemble wave-like crests, or umbrellas.
- A pileus cloud is transient in nature and lasts barely for a few minutes, making it difficult, and at the same time, exciting, to spot.



❖ **Cloud iridescence:**

- Cloud iridescence or Irisation is an optical phenomenon that mostly occurs in wave-like clouds, including pileus and Altocumulus lenticularis.
- Iridescence in clouds means the appearance of colours on clouds, which can either be in the form of parallel bands like in a rainbow, or mingled in patches.
- In ancient Greek mythology, Iris is the goddess of rainbow.
- “Irisation”, the phenomenon of rainbow-like colours in clouds, is derived from her name.
- Iridescence of clouds is a photometer – an optical phenomenon produced by the reflection, refraction, diffraction or interference of sunlight.
- ❖ Cause of cloud iridescence:
 - In pileus clouds, small water droplets or ice crystals, usually of a similar size, diffract the sunlight falling on them. The thinness of the cloud ensures more exposure to sunlight for each water droplet or ice crystal.
 - To ensure its wave crest-like appearance, water droplets or ice crystals in these clouds are always moving – droplets form at one side of the cloud and evaporate from the other end – and hence these clouds remain small and thin since the droplets have no way of combining and growing in size.
 - Diffraction: Iridescence or Irisation is caused by diffraction within 10 degrees from the sun. Beyond ten degrees and up till about 40 degrees, interference of light is the main cause of iridescence.

ANSWER WRITTING

Q. Examine the role of ‘Gig Economy’ in the process of empowerment of women in India.

- A gig economy is a free market system in which temporary positions are common and organisations contract with independent workers for short-term engagements. According to a report by Boston Consulting Group, India’s gig workforce comprises 15 million workers employed across industries such as software, shared services and professional services.
- Gig economy will expand and boost women’s employment because it is based on flexible, temporary, or freelance jobs. This has the potential of absorbing more women and increases their participation in the workforce. This will encourage those women who could not opt for full-time work to join the workforce.

Challenges

- The gig economy thrives largely unregulated; therefore, workers have little job security and few benefits.
- A worker needs to be skilled enough. Unless a person is extremely talented, his bargaining power will necessarily be limited. While companies routinely invest in training employees, a gig-economy woman worker will have to upgrade his skills on his own at his own cost.
- There are already many more potential online independent workers than jobs, and this demand-supply mismatch will only get worse over time, depressing wages especially for women.

To safeguard the interest of both employers and employees, some labour laws and regulations are required in the changing world of work. Also, documenting best practises across the globe on how different industries are using new technologies and at the same time creating job opportunities for women would help create supportive policies.

MCQs

1. Consider the following pairs of vaccine and category/type:
 1. Covaxin: Inactivated pathogen-based vaccine
 2. Covishield: mRNA vaccine
 3. Sputnik V : Viral vector-based vaccine
 Which of the pairs given above is/are correctly matched?
 - a) 1 only
 - b) 2 and 3 only
 - c) **1 and 3 only**
 - d) 1, 2 and 3
2. Consider the following statements
 1. Mission Indradhansuh was identified as one of the flagship schemes under Gram Swaraj Abhiyan
 2. The Full Immunisation Coverage among children aged 12-23 months of age has increased above 15 percent between Family Health Survey-4 (FHS) to Recent FHS-5.
 Choose the correct statement using the codes given below
 - a) 1 only
 - b) 2 only
 - c) **Both 1 and 2**
 - d) Neither 1 nor 2
3. Consider the following statements
 1. Vaccines against rotavirus, rubella and polio (injectable) will help India meet its Sustainable Development Goals 4 targets that include reducing child mortality.
 2. Recently Measles-Rubella vaccine included in Universal Immunisation Programme (UIP).
 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**
4. With respect to the hepatitis C, consider the following statements:
1. It can be transmitted sexually and from an infected mother to her baby but not through breast milk, food or water.
2. Currently, there is no vaccine against hepatitis C.
Which of the statement/s given above is/are correct?
a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2
5. With reference to Dhole, consider the following statements:
1. The species is limited to Eastern and Western Ghats in India.
2. It is listed as Schedule II species under the Wildlife (Protection) Act, 1972
3. Dhohes are named wild dogs because; they are genetically similar to dogs.
Which of the statements given above is/are correct?
a) 1 and 3 only
b) **2 only**
c) 1 and 2 only
d) 3 only
6. Raja Mudra seal recently seen in news is associated with which of the following?
a) **Sivaji**
b) Pulakesin II
c) Vikramaditya I
d) Krishnadevaraya
7. Recently, an unusually-shaped rainbow cloud appeared over China, consider the following statements with regards to its formation mechanism
1. Iridescent clouds are a diffraction phenomenon caused by small water droplets or small ice crystals individually scattering light.
2. Larger ice crystals do not produce iridescence, but can cause halos.
Select the correct statement using the codes given below
a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2
8. Recently government has decided to set up India's first-ever "Night Sky Sanctuary" in Ladakh which of the following state or UTs?
a) Jammu and Kashmir
b) Himachal Pradesh
c) Uttarakhand
d) **Ladakh**
9. Changthang Wildlife Sanctuary often mentioned in news is located in which of the following state or UTs?
a) Jammu and Kashmir
b) **Ladakh**
c) Arunachal Pradesh
d) Sikkim
10. India recently overtakes which of the following country to become world's 5th largest economy?
a) France
b) UAE
c) **UK**
d) Australia