

ENVIRONMENT

❖ **Marine Protected Areas**

➤ **CONTEXT:** Roughly 10 million square kilometers of the ocean must be annually brought under Marine Protected Areas (MPA) to protect 30 per cent of the world's ocean by 2030, according to experts speaking at the ongoing fifth International Marine Protected Areas Congress.

- Countries set a target of protecting 30 per cent of the planet's lands and oceans by 2030 at the 15th Conference of the Parties (COP15) to the Convention on Biological Diversity (CBD) held in 2022.
- Currently, MPAs represent only about 6 per cent of the ocean.
 - ✓ Of this, 2.4 per cent are fully and highly protected and 3.6 per cent are highly protected.
 - ✓ The remaining 0.8 per cent are designated and 2 per cent have been proposed and committed.
 - ✓ Fully protected areas prevent extractive or destructive activities.
 - ✓ Highly protected MPAs allow light extractive activities.

➤ **What are Marine protected areas?**

- Marine protected areas (MPA) are protected areas of seas, oceans, estuaries or in the US, the Great Lakes.
- MPAs restrict human activity for a conservation purpose, typically to protect natural or cultural resources.
- Definition:
 - ✓ The International Union for Conservation of Nature (IUCN) defines a marine protected area as: Marine protected area (MPA) is a term for protected areas that include marine environment and biodiversity.
 - ✓ The Convention on Biological Diversity defined the broader term of marine and coastal protected area (MCPA): any defined area within or adjacent to the marine environment, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings.
- IUCN offered seven categories of protected area, based on management objectives and four broad governance types.

Category	IUCN Protected Area Management Categories:
Ia	Strict nature reserve A marine reserve usually connotes "maximum protection", where all resource removals are strictly prohibited.
Ib	Wilderness area
II	National park A marine park may prohibit fishing or extraction of resources, but allow recreation.
III	Natural monuments or features Established to protect historical sites such as shipwrecks and cultural sites such as aboriginal fishing grounds.
IV	Habitat/species management area Established to protect a certain species, to benefit fisheries, rare habitat, as spawning/nursing grounds for fish, or to protect entire ecosystems.
V	Protected seascape Limited active management, as with protected landscapes.
VI	Sustainable use of natural resources

Marine Protected Areas in India

- Considering both the national parks along the coastlines of the peninsular Indian subcontinent as well as the sanctuaries in the islands and Union Territories there are altogether 31 marine protected areas in India.
- There are four significant national parks where the Bureau of the Interior Department checks human interference in marine life as per the terms of 1972's Wildlife Protection Act.
- Examples:
 - ✓ Bhitarkanika National Park
 - ✓ The Sundarbans in West Bengal.
 - ✓ The Gulf of Mannar Marine Conservation in Tamil Nadu.
 - ✓ The Gulf of Kachchh in the southern part of Gujarat.
 - ✓ Some notable marine sanctuaries of the country include: Chorao Island in Goa, Chilka in Odisha, Malvan Sanctuary and Thane Creek Sanctuary of Maharashtra, Pulicat Lake of Andhra Pradesh.
 - ✓ The union territories of Lakshadweep and Andaman and Nicobar Islands also feature numerous protected areas to safeguard marine life.

➤ **Conclusion**

- The Marine Protected Areas in India feature a rich variety of wildlife that attracts visitors from different nations.
- After the Wildlife Protection Act was passed in 1972, the Wildlife Conservation Society has put extensive efforts to preserve marine biodiversity.
- Still, large areas remain unprotected.
- The nation as a whole commit to the act of protecting the biodiversity that bring pride to our nation and are part of our profound heritage.

GEOGRAPHY

❖ **Why were the Turkey earthquakes so deadly?**

➤ **CONTEXT:** Two large earthquakes, one of magnitude 7.8 and closely followed by a magnitude 7.5, hit south-eastern Turkey, claiming at least 17,000 lives and counting, wreaking considerable damage in Turkey as well as Syria. Nearly 200 aftershocks have followed with earthquakes of magnitude 6 being reported in the region three days after the first tremor.

➤ **What causes earthquakes?**

- The earth's crust is made up of roughly 15 massive segmented chunky slabs called tectonic plates which are constantly in motion. The land on which buildings are built rests on these plates. The plates continually collide, push and grate against each other and the meeting points of these plates are made up of a series of 'faults.'
- The pent-up energy from the nestling plates, along faultlines, is often released when an imbalance in pressure causes rocks on either side of the fault to re-adjust. One set of rocks rising up relative to the other is a 'normal' fault, and one sliding down relative to the other is a 'reverse' fault. When they grate or move past one another, it's a 'strike-slip.' The energy released travels as waves that cause the ground to shake.

➤ **What kind of earthquake occurred in Turkey and Syria?**

- Turkey and Syria lie at the confluence of three plates — the Arabian Plate, the Anatolian Plate and the Eurasian Plate, making the region an extremely seismically active zone.



- The Arabian Plate is inching north into Europe, causing the Anatolian Plate (which Turkey sits on) to be pushed out west. The bulk of Turkey sits on the Anatolian Plate between two major faults:

- ✓ The North Anatolian Fault
- ✓ The East Anatolian Fault.

- According to Geologists the earthquakes were from a 'strike-slip' which is typical of the earthquakes in the region.

➤ **Why were these earthquakes so devastating and deadly?**

- As this region hosts many fault systems, there are many earthquakes being recorded in the region. Only those that result in a release of energy above a certain threshold are captured by seismological instruments. At magnitude 7.8, the February 6 event is much bigger than the ones the area has experienced before. The fault system runs along nearly 190 km which is why the impact of the earthquakes was so far-ranging.
- The second earthquake, of 7.5 magnitude, occurred further to the north on a different but adjacent fault system called the Sürgü Fault. The magnitudes of these earthquakes suggest that there will be several aftershocks that can be registered in a wide radius and reports of shakes from as far away as Cairo (950 km) and Istanbul (815 km) away have been reported.

➤ **Are there similarities to earthquakes in India? Can energy from latent pressure be built up over the years?**

- The Indian Plate, colliding into the Eurasian plate and tilting upwards, created the Himalayas. The most common type of earthquake in the Himalayan region is due to reverse faults because of the compressive forces between the two plates. "However, whether it's strike-slip or a thrust, the waves generated can be as powerful." Scientists have longed warned of a massive, overdue earthquake in the Garhwal-Kumaon range here because of what is known about the pattern of quakes in the region.
- Based on the amount of 'slip' (or movement) that is observed in an earthquake and measurements of the amount of 'strain' that accumulates every year, scientists can deduce the latent pressure that's building up

along a fault has been released. “Experts don’t have very accurate records that date back, say a thousand years, on 7+ magnitude earthquakes. The records of the last 300 or so years suggest that those that have occurred haven’t released all the pent-up energy and that’s why experts think a major one (maybe even an 8 magnitude one) is overdue. However the day is unpredictable.

- In the Turkey-Syria earthquakes, energy from nearly 300 years of accumulated strain was released.
- **How much does the magnitude of earthquakes correlate to the damage they inflict?**
- It is only broadly true that the magnitude of earthquakes corresponds to death and devastation. Chile, a country with a long history of devastating earthquakes (over 9), is considered to be a model for earthquake preparedness.
- Despite experiencing earthquakes with magnitudes over 8 in 2014 and 2015 casualties are extremely minimal due to years of strictly enforcing building codes. This despite being a much poorer country than Japan, also known for its experience in earthquake-proofing structures.
- The 9-magnitude earthquake that caused a tsunami and a radiation leak in the nuclear power plant in the country’s Fukushima prefecture in 2011, didn’t damage the stability of the structure. “Just as the energy released exponentially rises in a single step of the scale (Moment Magnitude), the cost of earthquake-proofing too rises exponentially. On the other hand, if structures are built on a fault line, then no amount of engineering can save them.”
- A lack of enforcement of building codes in Turkey and the timing of the earthquake in the early morning are believed to be major factors for the death and devastation inflicted.
- It’s a bit like India where lots of rules (on building codes) but there is limited enforcement. The 1993 Latur earthquake for instance was a little over 6 magnitude but caused enormous damage because building codes are not enforceable there.

PRELIMS

1. Quasicrystal

➤ **CONTEXT: Scientists have discovered a new type of quasicrystal, one with 12-fold symmetry, in the Sand Hills of north central Nebraska, USA.**

- It said that this quasicrystal was formed during an accidental electrical discharge, possibly by a lightning strike or a downed power line in a dune.
- Quasicrystal is essentially a crystal-like substance. However, unlike a crystal, in which atoms are arranged in a repeating pattern, a quasicrystal consists of atoms that are arranged in a pattern that doesn’t repeat itself regularly.
- the study, ‘**Electrical discharge triggers quasicrystal formation in an eolian dune**’, has been done by Luca Bindi of the University of Florence (Italy), Paul Steinhardt of Princeton University (USA) and others.
- According to the study, it’s also the first time that researchers have found a quasicrystal somewhere other than meteorites or the debris from nuclear blasts. Notably, scientists have been producing them in laboratories for years now, but it’s quite rare to discover naturally occurring quasicrystals.
- The dodecagonal quasicrystal is an example of a quasicrystal of any kind formed by electrical discharge, suggesting other places to search for quasicrystals on Earth or in space and for synthesising them in the laboratory.

➤ **What is a quasicrystal and where are they used?**

- For the longest time, physicists believed every crystalline arrangement of atoms must have a pattern that repeats itself perfectly over and over again. However, this changed in 1982, when material scientist Dan Shechtman discovered crystal structures that are mathematically regular, but that do not repeat themselves.
- While studying diffraction patterns, which occur when X-rays are passed through the crystals, Shechtman noted “a regular diffraction pattern that did not match any periodically repeated structure”, and concluded that he has come across what are now known as quasicrystals. For his discovery, he was awarded a Nobel Prize in Chemistry in 2011.
- Since their discovery, quasicrystals have been widely created in labs and known to “possess novel electrical, photonic, and mechanical properties that aren’t found in other materials, making them an attractive prospect for materials scientists. They are used in manufacturing non-stick frying pans, needles for acupuncture and surgery, dental instruments and razor blades.

➤ **What are the findings of the new study?**

- Although quasicrystals can be easily produced, they are rarely found outside of the laboratory. The first one was identified in a meteorite, found in 2009 near the Khatyrka River in Chukhotka, Russia.
- The second one was discovered in 2021 during the study of debris from the site of the world’s first nuclear explosion, which took place in 1945 in New Mexico.
- Scientists suggest that in both instances, for the formations of quasicrystals, materials were subjected to extremely high-pressure and high-temperature shock events.

- According to the report, an “analysis of the meteorite (found in 2009) sample revealed the temperature reached at least 1200 degree Celsius and the pressure 5 GPa, while the New Mexico sample reached 1500 degrees Celsius and closer to 8 GPa. These transient, intense conditions contorted the materials’ atoms, forcing them to arrange into patterns unseen for usual laboratory conditions.”
- The latest discovery is only the third time that scientists have come across a quasicrystal in nature. As per the study, the quasicrystal was created by a lightning strike or a downed power line in a wind-created dune in the Sand Hills of Nebraska.
- “The discharge produced extreme temperatures (more than 1,710 degree Celsius) that led to the formation of a fulgurite, a tube of fused and melted sand along with traces of melted conductor metal from the power line”. The new quasicrystal was found inside a tubular piece of fulgurite.
- The scientists behind the latest research also mentioned that the discovered quasicrystal has a dodecagonal or 12-sided atomic structure, which is quite unusual because the previously found quasicrystals, as well as the lab-grown ones, have five-fold symmetric patterns.

2. Sukanya Samridhi Account

➤ **CONTEXT: The Prime Minister, Shri Narendra Modi has congratulated India post for opening more than 10 lakh Sukanya Samridhi Account in two days.**

- A minimum of ₹250 (earlier Rs. 1000) and maximum of ₹1.5 lakh can be invested in a financial year in one account.
- The minimum annual deposit requirement, or the minimum amount required to be deposited in Sukanya Samridhi account every year, has also been lowered to Rs 250, from Rs 1,000 earlier.
- (SSA) is a social welfare scheme launched in 2014 to promote the welfare of girl child and facilitate the interests of a girl child such as her education and marriage.
- Parents (legal guardians) can open only one account in the name of one girl child and maximum two accounts in the name of two different girl children.
- The account can be opened up to the age of 10 years only from the date of birth of the girl child, whereas investment can be made till the child attains the age of 15 years.
- The interest rate on Sukanya Samridhi account is revised every quarter, like other small savings instrument such as public provident fund (PPF), and Senior Citizen Savings Scheme (SCSS).
- Sukanya Samridhi account will mature on completion of 21 years from the date of opening of account.
- Partial withdrawal will be allowed on the account holder attaining the age of 18 to meet educational or marriage expenses. Withdrawal will be limited to 50% of the balance standing at the end of the preceding financial year.
- Normal premature closure will be allowed for the purpose of the account holder’s marriage, if she has attained the age of 18.
- Contribution to SSA qualifies for tax deduction under Section 80C.

3. Aero India Show 2023

➤ **CONTEXT: The five-day Aero India show, in its biggest avatar yet, began at the Air Force Station in Yelahanka, Bengaluru on February 13. Prime Minister Narendra Modi inaugurated the 14th edition of the biennial show.**

- On the theme ‘The runway to a billion opportunities’, it seeks to display India’s growth in aerospace and defence capabilities. Flying displays are also scheduled on all five days. Aero India is a business event, it additionally aims to strengthen India’s relations with others countries.
- Likely to witness the participation of 98 countries, the Defence Ministers of 32 countries, Air Chiefs of 29 countries and 73 CEOs of global and Indian OEMs or Original Equipment Manufacturers are expected to attend the event. MSMEs and start-ups in the field will also be present.

➤ **What is the Aero India show?**

- On behalf of the Department of Defence Production of the Ministry of Defence, Aero India is being organised by Hindustan Aeronautics Limited (HAL) in 2023.
- Major exhibitors include defence and aircraft manufacturing companies like Airbus, Boeing, Dassault Aviation, Lockheed Martin, Israel Aerospace Industry, BrahMos Aerospace, Army Aviation, HC Robotics, SAAB, Safran, Rolls Royce, Larsen & Toubro, Bharat Forge Limited, Bharat Electronics Limited (BEL), Bharat Dynamics Limited (BDL) and BEML Limited.
- The event aims to promote export of indigenous air platforms like Light Combat Aircraft (LCA)-Tejas, HTT-40, Dornier Light Utility Helicopter (LUH), Light Combat Helicopter (LCH) and Advanced Light Helicopter (ALH).
- It will integrate domestic MSMEs and start-ups in the global supply chain and attract foreign investments including partnerships for co-development and co-production.
- What is expected at this year’s exhibition?

- A number of seminars will be held – on Harnessing the Potential of Ex-servicemen for Indian Defence Industry, India's Defence Space Initiative, Opportunities for shaping the Indian private space ecosystem, Indigenous development of futuristic aerospace technologies, and more.
- A Defence Ministers' Conclave will be hosted on February 14. Defence Ministers of friendly foreign countries will participate in the meeting, which has been organised on the theme 'Shared Prosperity through Enhanced Engagements in Defence (SPEED).
- About 251 MoUs, with an expected investment of Rs 75,000 crore, are likely to be signed for partnerships between various Indian and foreign defence companies and organisations during the Bandhan ceremony on February 15.

ANSWER WRITING

Q. "The health of municipal finances in India is worrisome and a multi-pronged strategy is needed to deal with this" comment.

The 74th Constitutional Amendment Act marked a watershed in the evolution of municipalities as it granted them constitutional status with a clear mandate for democratic decentralisation. This did not, however, result in a structural shift in the way municipal corporations functioned. According to the RBI report on municipal finances in FY 21, 141 municipal corporations saw a sharp decline in revenue or a significant increase in expenditure of over 75 per cent.

Issues in municipal finances:

- No exclusive fiscal domain for municipal governments: State laws specify the taxes that municipalities can levy and collect. States stipulate the purposes for which funds may be spent, fix salaries, and impose limits on the amount of debt. The lack of autonomy in fixing tax rates is one of the most serious handicaps that municipal governments face in managing their finances.
- A declining share of municipal's own source of revenue: Among own revenue sources, over-reliance on property tax has constrained exploiting other avenues of funding, such as trade licences, entertainment taxes, taxes from mobile towers, solid waste user charges etc.
- Internal inefficiencies: Lack of municipal capacity at technical and managerial levels to tap resources efficiently has not led ULBs to leverage their full potential.
- Ineffective State Finance Commission (SFCs): State governments have not set up SFCs in a regular and timely manner even though they are required to be set up every five years. Accordingly, in most States, SFCs have not been effective in ensuring rule-based devolution of funds to Local governments.

Measures to deal with the above issues:

- Creating a market for municipal bonds: A vibrant sub-sovereign/municipal debt market catering to a robust investor appetite for municipal bonds can provide an avenue for access to public funds.
- Tapping land-based financing: This area has enormous potential for revenue generation in the case of municipal corporations. Instruments may include vacant land tax (VLT) and a two-part property tax with a higher rate for land than buildings.
- Improving municipal financial management: There is a need to create positive and negative incentives and accountability frameworks to incentivize and regulate municipal bodies in order to overcome the problem of inefficient administration of existing revenue sources.
- Institutional capacity building: Create a Reform and Performance Management Cell (RPMC) in the Government of India (and at the state level and in large cities) with a multidisciplinary team undertaking activities such as:
 - Providing technical assistance to state governments, regulators, and Municipal bodies in planning, finance, operations, and monitoring of urban programmes.
 - Creating a dedicated Municipal Information Unit to collect, collate, and analyse comparable data on municipal services and finances on an annual basis.
- Municipal finance can also be boosted by developing partnerships with impact finance in the private space.
- Pushing for outsourcing (for example, garbage services) and exploring PPP models (hybrid annuity models), and participatory budgeting.

Local governments constitute a critical tier in India's three-level governance system. Accordingly, strengthening the governance structures of civic bodies, and financially empowering them through a combination of generation of their own resources and greater transfers are critical for effective public policy interventions at the grass-root level.

MCQs

1. Consider the following
 1. Marine protected areas (MPAs) are defined by the World Conservation Union (IUCN)
 2. Currently, Marine Protected Areas (MPAs) represent only about 6 per cent of the ocean.

3. Fully marine protected areas prevent extractive activities, while highly protected MPAs allow light extractive activities.
Which of the above statement/s is/are correct?
a) 1 and 2 only b) 2 and 3 only c) 1 and 3 only **d) 1,2 and 3**
2. With reference to Aero India Show 2023 consider the following
1. It is an annual show of various Air forces defence capabilities across the globe.
2. In 2023 On behalf of the Department of Defence Production of the Ministry of Defence, Aero India is being organised by Hindustan Aeronautics Limited (HAL)
Which of the above statement/s is/are correct?
a) 1 only **b) 2 only** c) Both 1 and 2 d) Neither 1 nor 2
3. Which one of the following statements about the Sukanya Samridhi Scheme is NOT correct?
a) Only parents of girls up to the age of 10 years can open such accounts in their daughters name
b) Contributions are eligible for tax benefits under Section 80C of the Income Tax Act
c) Interest earned thereon is exempted up to Rs. 1500 per annum
d) A maximum of Rs. 1.50 lakh per annum can be invested in this account
4. With reference to quasicrystal consider the following
1. They do not occur naturally
2. They are used in manufacturing non-stick frying pans, needles for acupuncture and surgery, dental instruments and razor blades
Which of the above statement/s is/are not correct?
a) 1 only b) 2 only c) Both 1 and 2 d) Neither 1 nor 2
5. Which of the following is/are correct about Indian plate?
1. The Indian plate is tectonically different from the Peninsular India plate.
2. Eurasian plate has been sinking below the Indian Plate to form the Himalayas.
3. It forms a convergent plate boundary with the Himalayas, it also extends to Pakistan and Myanmar as well.
Select the correct answer using codes below:
a) 1 and 2 only b) 2 and 3 only c) 2 only **d) 3 only**
6. The Jaffna Cultural Center recently seen in news, is an important initiative signifying the close cultural cooperation between India and which of the following country?
a) Bangladesh b) Bhutan **c) Sri Lanka** d) Nepal
7. Prime Minister recently inaugurated the year long celebrations commemorating 200th birth anniversary of Maharishi Dayanand Saraswati, with reference to Daanad saraswati consider the following.
1. He was a social reformer who founded Arya Samaj in 1875 to counter then prevalent social inequities.
2. The Arya Samaj was based on the teachings of Puranas.
Which of the above statement/s is/are correct?
a) 1 only b) 2 only c) Both 1 and 2 d) Neither I nor 2
8. Recently police launched 'Operation Sandstorm,' a massive crackdown to end illegal mining of sand in Balasore district of Odisha, With reference to the management of minor minerals in India, consider the following statements:
1. Sand is a 'minor mineral' according to the prevailing law in the country.
2. State Governments have the power to grant mining leases of minor minerals, but the powers regarding the formation of rules related to the grant of minor minerals lie with the Central Government.
3. State Governments have the power to frame rules to prevent illegal mining of minor minerals.
Which of the statements given above is/are correct?
a) 1 and 3 only b) 2 and 3 only c) 3 only d) 1, 2 and 3
9. Recently Google launched 'Bard'. It is mainly a competitor to which of the following?
a) Yahoo's search engine, Bing
b) Amazon's web service, AWS
c) OpenAI's chatbot, ChatGPT
d) Meta's platform, Facebook
10. With reference to River Cities Alliance (RCA) consider the following
1. River Cities Alliance, first-of-its-kind Alliance in the world launched in 2021
2. DHARA, Driving Holistic Action for Urban Rivers, the annual meeting of the members of the River Cities Alliance (RCA) is organized by the National Mission for Clean Ganga (NMGC)
Which of the above statement/s is/are correct?
a) 1 only b) 2 only **c) Both 1 and 2** d) Neither 1 nor 2