INDIAN GEOGRAPHY

Heat waves in Mediterranean Sea

Context: Extreme heat has plagued the Mediterranean for weeks.

What are marine heat waves?

- A marine heat wave (MHW) is an extreme weather event.
- It occurs when the surface temperature of a particular region of the sea rises to 3 or 4 degree Celsius above the average temperature for at least five days.
- MHWs can last for weeks, months or even years

Problems of high sea temperatures

Suffocation:

- Marine creatures are in danger of suffocating.
- Gases like oxygen and carbon dioxide dissolve better at colder temperatures, so that means the warmer the water; the less oxygen is available to breathe.

Increase in metabolism:

- Conversely, higher temperatures also cause an increase in metabolism, which in turn means animals have to breathe even more than usual.
- That combination also heightens the risk of death by starvation for marine life.

Need for more food:

- The rise in temperature accelerates metabolism, and the organisms need more food to maintain this metabolic rate.

Algal blooms:

- Algal blooms are more common in hotter waters too.
- Such blooms can further deplete oxygen levels and produce toxins harmful for fish, marine mammals and birds.

Lethal for benthic species:

- High water temperatures are most harmful for animals living at the bottom of oceans, lakes or rivers.
- These benthic species include corals, mussels, sponges, starfish and plants like sea grasses, and are often attached to rock or solid ground.
- They can't migrate when it gets too hot.
- Scientists observed mass deaths of benthic species along thousands of kilometers of Mediterranean coastline between 2015 and 2019.

Significance of benthic species:

- Many benthic species are crucial to the marine ecosystem.
- They filter the water and keep seas, rivers and lakes clean by eating dead organisms.
- Some species are an important food source for other creatures or are harvested by humans.
- Benthics like soft corals, seaweed and sea grasses provide some of the main ocean habitats.

Loss of Posidonia Oceania:

- Heat is particularly harmful for Posidonia oceanica or Neptune grass.
- The large, slow-growing sea grass is found only in the Mediterranean.
- This species is of particular importance to humans as it serves as a major natural carbon sink and stores more carbon per square meter than forest ecosystems, making it one of the most effective ecosystems for long-term carbon storage

Benefits to some species:

Jellyfish bloom:

- Jellyfish are thriving because of higher temperatures, as well as nutrient run-off from farms and sewage.
- Overfishing and loss of fish habitat mean the jellyfish have few or no predators.
- When currents push the animals together, the Mediterranean turns into a crowded jellyfish hotspot.

Invasive species:

- The sea also hosts around 1,000 invasive species — the highest number in the world.

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- While this is not directly linked to climate change or rising temperatures such conditions clearly favor species introduced from warmer seas.
- Alien species can have a major impact on ecosystems.
- For instance, invasive Rabbit fish native to the Indo-Pacific and Rea Sea feed on seaweed and have reshaped the habitat of the eastern Mediterranean.
- Underwater deserts have replaced dense seaweed forests.

Impact of Mediterranean heat wave on humans:

- **Effect on fishing activities:**
  - Warming seas are already affecting fishing activities in the area.
  - Fishermen are catching fewer familiar species and instead are finding more invasive fish which they have difficulty selling.
- **Impact on coastal ecosystem:**
  - Habitat loss could also lead to an overall decline in fish populations, while disappearing seagrass means coasts will be more exposed to future storms.
- **Impact on tourism:**
  - This could also have a knock-on effect for tourism because divers will be less likely to visit an impoverished underwater landscape.

Way forward:

Reduction of emissions:

- One thing all the researchers agree on is that to save the Mediterranean Sea habitat, humans must stop emitting greenhouse gases.

Combating algal blooms:

- One important step is combating the growth of algal blooms which are worsened by run-off from agriculture, wastewater and industry.

Commitment to the UN goal:

- Scientists also hope that the UN goal of protecting 30% of the world's oceans by 2030 will directly benefit the Mediterranean.
- So far, just 8% of the sea is protected.

Increasing protected areas:

- We need to increase the number of strictly protected areas where fishing, diving and boating are not allowed.
- Well protected areas are recovering faster and better.

Introducing beneficial invasive species:

- Tropical seaweed Halophila stipulacea Ascherson, originally native to the Red Sea, copes well with rising temperatures and salinity levels compared to other seaweeds.
- It's an invasive species that could potentially help sea grass beds survive in a smaller part of the Mediterranean and continue to provide some of their essential ecosystem services.
- The native Neptune grass can deal with rising Mediterranean temperatures if they are intentionally exposed to heat as young seedlings.

About Mediterranean Sea

- The Mediterranean Sea is a sea connected to the Atlantic Ocean and almost completely enclosed by land:
  - ✓ on the north by Western and Southern Europe and Anatolia,
  - ✓ on the south by North Africa, and
  - ✓ On the east by the Levant.
- Although the Mediterranean is sometimes considered a part of the Atlantic Ocean, it is usually referred to as a separate body of water.
- The Mediterranean Sea covers an area of 0.7% of the global ocean surface, but its connection to the Atlantic via the Strait of Gibraltar—the narrow strait that connects the Atlantic Ocean to the Mediterranean Sea and separates the Iberian Peninsula in Europe from Morocco in Africa—is only 14 km (9 mi) wide.
- The Mediterranean Sea encompasses a vast number of islands, some of them being of volcanic origin.
- The two by far largest islands are Sicily and Sardinia.
- The drainage basin encompasses a large number of other countries, the Nile being the longest river ending in the Mediterranean Sea.

GOVERNMENT POLICIES & INTERVENTIONS

India to de-risk Infrastructure Development

- **In News-**The triad of PM Gati Shakti, Project Monitoring Group (PMG) and public private partnerships (PPP) forms the backbone for accelerated infrastructure development .

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About the infrastructure development

- **Traditional methods of infrastructure expenditure**: Traditionally, public capital expenditure on the creation of public utilities has had only a limited assessment of risks and financial returns.
- The risk spectrum of infrastructure development is broad and spans political, administrative, regulatory and market-based adversities.
- **Changed approach**: India is moving from sole reliance on public Capital expenditures to incorporating private investment for infrastructure development.
- The Indian government has encouraged private and foreign investment through various promotional measures, such as:
  - ✓ A liberal FDI policy, Ease of Doing Business measures like a National Single Window System, fiscal incentives, etc.
  - ✓ The establishment of agencies like Invest India, among others.
  - ✓ A range of investment de-risking measures have also been introduced, leveraging technology, an integrated approach in planning, rationalized risk-sharing mechanisms, etc.
  - ✓ India's triad of investment de-risking: The PM Gati Shakti National Master Plan, Project Monitoring Group and Public Private Partnerships form a triad of investment de-risking.
  - ✓ PM Gati Shakti National Master Plan
- **Geographic Information System (GIS) platform**: PM Gati Shakti seeks to revolutionize infrastructure development through a 'whole of the government' approach: a digital Geographic Information System (GIS)-based platform and an institutional arrangement.
- This initiative aims to develop plans for integrated multimodal infrastructure for the efficient transportation of goods and people.
- **Data-driven decision-making**: By bringing together various ministries and departments on a single digital platform, PM Gati Shakti enables data-driven decision-making for project planning and implementation.
- More than 38 ministries/departments of the central government, 28 states and eight Union territories are already part of it.

Network Planning Group (NPG):

➢ **Planning stage:**

- The traditional process of inter-ministerial consultation at the planning stage of projects has been substituted by a collaborative evaluation at the national level by a Network Planning Group (NPG) to foster synchronized decision-making and reduce administrative risk. Land acquisition risk, common in infrastructure development, is also minimized by using the planning tools available on the GIS platform.

➢ **Implementation stage:**

- At the implementation stage, the project is subject to another de-risking mechanism in the form of the Project Monitoring Group, which also has an administrative set-up and digital dashboard. This operates as a special cell in the government's Cabinet Secretariat.
- **Multimodal connectivity**: PM Gati Shakti also emphasizes multimodal connectivity to economic nodes and cargo hubs. This enhances the commercial viability of network projects as well as the infrastructure or manufacturing units connected to it. Implementation risk to the extent foreseen at the planning stage, is minimized through the PM Gati Shakti mechanism.

Project Monitoring Group

- The Project Monitoring Group takes up issues related to Central and state-level ministries/departments for quicker resolution.
- This includes clearances, permissions, land acquisition, grants of right-of-way/use, licensing or leasing needs, and forest and environmental clearances, apart from law-and-order and contractual issues, etc.
- Thus far, this mechanism has resolved a multitude of issues related to various projects, both public and private.

Public Private Partnerships

- The PPP model is another mechanism for an equitable and rational distribution of risks and rewards between public authorities and private partners.
- Over the past three decades, PPP in India has evolved from being merely an extra budgetary resource for project financing to a robust tool, attracting private capital along with state-of-the-art technologies and best practices in infrastructure development.
- After 1991, this mechanism led to the infusion of private capital amounting to about â‚¹68 trillion with over 9,200 infrastructure projects.
- The last decade has clocked an almost equal number of projects, worth about 40% of the total PPP investment so far.
- This growth is significant and can be attributed to de-risking measures.

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Way ahead

- Intensifying these measures is likely to boost investor confidence and attract further investments, laying the foundation for a more efficient and resilient logistics ecosystem, a sine qua non for the greater integration of India's economy with global value chains.
- India's joining a global club of the 10 most efficient logistics ecosystems would be incidental to it.

PRELIM FACT

1. Alzheimer Disease

In News-The researchers have found that the drug named Donanemab slowed cognitive decline in 47% of Alzheimer patients.

About

- Donanemab is still in trials, following on the heels of another drug, lecanemab.
- There were a further set of complications associated with donanemab in the trial. Donanemab, like lecanemab and aducanumab, could cause fatal brain bleeding and seizures.
- As per the oxidative stress hypothesis, the brain remains healthy as long as 'free radicals' that are produced in the course of the various biochemical reactions in the body are kept in check by 'anti-oxidants.'

Dementia

- Dementia is a term for several diseases that affect memory, thinking, and the ability to perform daily activities. The illness gets worse over time.
- Alzheimer's disease is the most common form of dementia and may contribute to 60-70% of cases.
- The build-up of amyloidal protein in the brain, believed to be most significantly associated with the disease. Elevated levels of amyloidal form plaque and trigger another protein called tau that damages brain cells.
- There were 55 million globally living with dementia. This number is expected to double every 20 years and be about 78 million by 2030 as per the Alzheimer's disease International.
- India is expected to have about 7.6 million afflicted by 2030, as per the Dementia in India Report, 2020.

Antioxidant enzymes

- Free radicals often damage healthy cells, and are believed to be involved in a range of diseases including Parkinson's. The natural defence against such unwanted oxidation is a range of 'antioxidant enzymes'; such as superoxide dismutase (SOD), glutathione peroxidase (GPX), catalase or aldehyde dehydrogenase and nonenzymatic antioxidant factors.
- The antioxidant enzymes catalyze the reaction of reduction of free radicals, which diminishes their power and hence oxidative cyto toxicity.
- As long as there is a balance between the oxidative molecules and antioxidants to neutralise them, the body remains healthy.

Impacts of Dementia

- It has significant social and economic implications in terms of direct medical and social care costs, and the costs of informal care.
- There is often a lack of awareness and understanding of dementia, resulting in stigmatization and barriers to diagnosis and care.

2. Piripkura Tribe

Context- Brazil found the last survivors of an Amazon tribe. Tamandua is one of the last three known survivors of the Piripkura people.

About the Piripkura Tribe

- The Piripkura tribe is a small and isolated indigenous community.
- They are distinguished by their severe isolation and minimal contact with the outside world.
- For years, they have purposefully avoided contact with mainstream civilization and have kept their ancient way of life.
- Their land is located within the Amazon rainforest, an area rich in biodiversity and critical to the region's ecological equilibrium.
- The Piripkura tribe is thought to be made up of only three people.
- Due to their isolation and the challenges concerned, it is difficult to estimate the total of their population.
- They come across different types of dangers to their survival, such as illicit logging, mining, and land encroachment.

3. Vegetated canopies

Context: One initiative to bring greenery back to urban spaces in Spain involves installing vegetated awnings or canopies.

About vegetated canopies

- The awnings are tensioned sail-like structures that have been anchored to the facades of surrounding buildings.
- They mimic natural canopies found in forests and various plant species.
- The lightness and ease of installation of the 'Greenshades' allow for shade and the presence of greenery in commercial streets and public spaces, where trees or other vegetation are often absent.

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How they work:

- The sails with anchors and supports are prepared by laying down the specific geotextile substrate or material.
- An irrigation system is installed at the highest side, from where the water falls by gravity, soaking the entire substrate.
- In addition to water, fertilizer keeps the vegetation in perfect condition.
- The excess water is collected at the lowest point and into a connected drainage system.
- The seed mixture is then projected onto the geo-textile.
- After four months, the shade is expected to be completely covered with vegetation.
- The plants grow hydroponically, with a water supply point and water outlet for draining purposes.

Advantages

- The tensile spaces are designed to reduce the temperature both in their surroundings and under the cover.
- Behind this is the phenomenon of evapo-transpiration, which is the transfer of water to the atmosphere by plants.
- The plants chosen for these awnings belong to species that are optimised for the absorption of gases such as carbon monoxide and nitrogen oxide.
- The substrate also absorbs sound waves, reducing noise pollution.
- A square metre of a vegetated canopy generates the oxygen required by a person for the whole year, apart from filtering harmful gases.
- The hanging planter also allows for the centralisation of water and light installations.
- This is meant to induce savings as the lights are equipped with movement sensors that illuminate the street according to its need.
- The adoption of such canopies could eventually contribute to urban biodiversity, creating a healthier ecosystem that supports a variety of wildlife.

ANSWER WRITTING

Q. How will the melting of Himalaya's glaciers have a far-reaching impact on the water resources of India? (150 Words, 10 Marks)

Introduction:

- The Himalayas are one of the most significant mountain ranges in the world, with an estimated height of over 8,849 meters. The melting of glaciers in the Himalayas is a cause of concern for India's water resources. As the source of many major rivers, including the Ganges, Brahmaputra, and Indus, the melting of Himalayan glaciers can have far-reaching impacts on water availability, irrigation, hydropower generation, and socio-economic development in the region.
- The melting of Himalayan glaciers could impact the water resources:
  - ✓ Increase in River flows: The melting of glaciers can lead to an increase in the volume and intensity of river flows, which can cause flash floods and landslides. E.g.- Ganga- Brahmaputra-Meghna basin, Population over 700 million people (2022).
  - ✓ Impact on Monsoon: The Himalayas exerts a significant influence on seasonal shifts in the monsoon circulation and the distribution of rainfall in India.
  - ✓ According to IPCC projections, the melting of glaciers could indicate a likely increase in summer rainfall by 4-12% in the near term and 4-25% in the long term. The south-west monsoon accounts for 70% of the annual rainfall in India.
  - ✓ Changing monsoon patterns, including increased severity and frequency of storms, could lead to mountain hazards that may destroy critical infrastructure.
  - ✓ Impact on agriculture: The melting of Himalayan glaciers could affect the availability of water for irrigation, which could lead to a decline in crop yields and a significant impact on the livelihoods of farmers.
  - ✓ Impact on hydropower generation: Changes in the flow of water in rivers could affect the efficiency and reliability of hydropower plants, which could lead to power shortages and disruptions.
- The Himalayas are of immense importance to the people who rely on their resources for their livelihood. The melting of the glaciers in this region has already begun to impact us severely. It is important to take measures to mitigate the effects of climate change on the Himalayan glaciers and ensure the sustainable use of these resources for future generations.

MCQ

1. With reference to the BRICS grouping consider the following statements:
   1. BRICS countries account for a substantial portion of the world's GDP and trade volume.
   2. BRICS is seen as a geopolitical force that aims to reform global institutions, challenge existing power dynamics, and address the concerns of developing nations on international platforms.
   3. The New Development Bank (NDB) was established by BRICS member countries with an emphasis on providing funding for space exploration projects.

   How many of the above statements is/are incorrect?
   a) Only one b) Only two
   c) All three d) None
2. Consider the following statements:

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1. As per 2011 census, tribal constitute 8.6% of the country's total population.
2. The responsibility of managing the birth and death registration lies with the central government.

Which of the above statements is/are incorrect?
a) 1 only **b) 2 only**
c) Both 1 and 2 d) Neither 1 nor 2

3. Consider the following statements.
1. Recently, the committee of former high court judges appointed by the Supreme Court to oversee relief and rehabilitation in Manipur has submitted the report.
2. They have submitted three reports — on loss and reconstruction of "essential documentation"; upgrading the compensation; and appointment of domain experts to facilitate its work.
3. The panel is headed by former Jammu and Kashmir High Court Chief Justice Gita Mittal.

How many of the above statements is/are correct?
a) Only one b) Only two
c) All three d) None

4. Consider the following statements, with respect to recently passed Anusandhan National Research Foundation (NRF) Bill
1. It set up National Research Foundation (NRF), an apex body to provide high-level strategic direction of scientific research in the country.
2. It envisages spending of Rs. 50,000 crore for five years.
3. Department of Science and Technology (DST) will be the administrative Department of National Research Foundation.

Which of the statements given above is/are correct?
a) 1 only b) 1 & 2 only
c) 2 & 3 only **d) 1, 2 & 3**

5. Consider the following statements, with reference to Liberalised Remittance Scheme (LRS)
1. Under the Scheme, all resident individuals, including minors, are allowed to freely remit up to USD 2, 50,000 per financial year
2. Scheme prohibits purchase of lottery tickets and sweep stakes abroad.

Which of the statements given above is /are incorrect?
a) 1 only b) 2 only
c) Both 1 and 2 **d) Neither 1 nor 2**

6. Consider the following statements about Katchatheevu Island.
1. The island is relatively new in the geological timescale, being the product of a 14-century volcanic eruption.
2. As a part of this settlement, known as the 'Indo-Sri Lankan Maritime agreement', Indira Gandhi 'ceded' Katchatheevu to Sri Lanka.
3. As per the agreement, Indian fishermen were still allowed to access Katchatheevu.

How many of the above statements is/are correct?
a) Only one b) Only two
c) All three d) None

7. Consider the following statements about Megaliths:
1. Megaliths mean large stones that represent the megalithic period, which lasted from 2500 BC to AD 200.
2. It has been used to construct a prehistoric structure or monument, either alone or together with other stones.
3. These were constructed either as burial sites or commemorative (non-sepulchral) memorials.
4. In India, megaliths are concentrated in the states of Maharashtra (mainly in Vidarbha), Karnataka, Tamil Nadu, Kerala, Andhra Pradesh and Telangana.

How many of the above statements is/are correct?
a) Only one b) Only two
c) Only three d) **All four**

8. Consider the following statements about BRICS.
1. BRICS is an acronym that started as BRIC in 2001, coined by Jim O'Neill (a Goldman Sachs economist) for Brazil, China, India, and Russia.
2. Later in 2012, South Africa was added to become BRICS.
3. Goldman Sachs claimed that the global economy will be dominated by the four BRIC economies by 2050.

How many of the above statements is/are correct?
a) Only one b) Only two
c) All three d) None

9. Consider the following statements
1. It is a major harvest festival in Kerala and is celebrated to honour the home-coming of Asura king Mahabali who brought about peace and prosperity in Kerala.
2. It is also one of the three major festivals of Kerala, celebrated during the month of Chingam, the first month in the Malayalam calendar, Kollavarsham.

Which of the statements given above is /are correct?
a) 1 only b) 2 only
c) Both 1 and 2 d) Neither 1 nor 2

10. What is the Minamata Convention?
1. The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury and its compounds.
2. It was agreed at the fifth session of the Intergovernmental Negotiating Committee in Geneva, Switzerland 2013.
3. Controlling the anthropogenic releases of mercury throughout its lifecycle is one of the key obligations under the Convention.

How many of the above statements is/are correct?
a) Only one b) Only two
c) All three d) None

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