

Rivers facing heavy pollution: CSE

(GS Paper 3, Environment)

Why in news?

- Recently, the State of Environment Report, 2022 from the environmental NGO, the Centre for Science and Environment (CSE) was launched.
- The report is an annual compendium of environment-development data and is derived from public sources.

Key observations:

- India has 764 river quality monitoring stations across 28 States. Of these, the Central Water Commission tested water samples from 688 stations for heavy metals between August 2018 and December 2020.
- Of the 588 water quality stations monitored for pollution, total coliform and biochemical oxygen demand was high in 239 and 88 stations across 21 States, an indicator of poor wastewater treatment from industry, agriculture and domestic households.
- India dumps 72% of its sewage without treatment. Ten States do not treat their sewage at all, as per the Central Pollution Control Board.

Metal Pollution

Three of every four river monitoring stations in India posted alarming levels of heavy toxic metals such as lead, iron, nickel, cadmium, arsenic, chromium and copper.

In about a fourth of the stations, which are spread across 117 rivers and tributaries, high levels of two or more toxic metals were reported.

Of the 33 monitoring stations in the Ganga, 10 had high levels of contaminants.

The river, which is the focus of the Centre's Namami Gange mission, has high levels of lead, iron, nickel, cadmium and arsenic.

Coastline erosion:

- **Over a third of India's coastline** that is spread across 6,907 km **saw some degree of erosion between 1990 and 2018.**
- West Bengal is the worst hit with over 60% of its shoreline under erosion.
- The reasons for coastal erosion include increase in frequency of cyclones and sea level rise and activities such as construction of harbours, beach mining and building of dams.

Ocean Health Index:

- While the global average of the Ocean Health Index, a measure that looks at how sustainably humans are exploiting ocean resources, has improved between 2012 and 2021, India's score in the index has declined over the same period.

Forest cover in India:

- India's total forest cover has registered **a little over a 0.5% increase between 2017 and 2021** though most of the increase has taken place in the open forest category, which includes commercial plantations.
- This has happened at the cost of moderately dense forest, which is normally the area closest to human habitations.

Concerns:

- At the same time, very dense forests, which absorb maximum carbon dioxide from the atmosphere, occupy just 3% of total forest cover.
- India has a forest cover of 77.53 million hectares. But recorded forests, the area under the forest department care only 51.66 million. This gap of 25.87 million hectares, a size bigger than U.P. remains unaccounted.

eVTOL

(GS Paper 3, Science and Tech)

Why in news?

- The Government of India is exploring the possibility of inviting manufacturers of **Electric Vertical Take off and Landing (eVTOL) aircraft** to set up base in India.
- India is in ‘conversation’ with a number of eVTOL producers — the implication being a futuristic vision for India.



What is eVTOL?

- As the acronym suggests, an **electric vertical take-off and landing (eVTOL) aircraft** is one that **uses electric power to hover, take off, and land vertically**.
- Most eVTOLs also use what is called as **distributed electric propulsion technology**, which means integrating a complex propulsion system with the airframe.
- There are **multiple motors for various functions**; to increase efficiency; and to also ensure safety. This is technology that has grown on account of successes in electric propulsion based on progress in motor, battery, fuel cell and electronic controller technologies and also fuelled by the need for new vehicle technology that **ensures urban air mobility (UAM)**. Thus, eVTOL is one of the newer technologies and developments in the aerospace industry.
- eVTOL is a “**a runway independent technological solution**” for the globe’s transportation needs. This is because it opens up new possibilities which aircraft with engines cannot carry out in areas such as manoeuvrability, efficiency and even from the environmental point of view.
- There are an estimated 250 eVTOL concepts or more being fine-tuned to bring alive the concept of UAM. Some of these include the use of multi-rotors, fixed-wing and tilt-wing concepts backed by sensors, cameras and even radar.
- eVTOLs have been likened to “**a third wave in an aerial revolution**”; the first being the advent of commercial flying, and the second, the age of helicopters.

Why are the developments in powering eVTOLs?

- The roles eVTOLs adopt **depends on battery technology** and the **limits of onboard electric power**. Power is required during the key phases of flight such as take off, landing and flight (especially in high wind conditions).
- There is also the **important factor of weight**. BAE Systems, for example, is looking at formats using a variety of Lithium batteries. Nano Diamond Batteries is looking at “**Diamond Nuclear Voltaic (DNV) technology**” using minute amounts of **carbon-14 nuclear waste encased in layered industrial diamonds** to create self-charging batteries.
- There are some industry experts who are questioning the use of only batteries and are looking at hybrid technologies such as hydrogen cells and batteries depending on the flight mission.
- There is even one that uses a gas-powered generator that powers a small aircraft engine, in turn charging the battery system. But whatever the technology, there will be very stringent checks and certification requirements.

What are the challenges?

- As the technology so far is a mix of unpiloted and piloted aircraft, the areas in focus include “crash prevention systems”.
- These use cameras, radar, GPS (global positioning system) and infrared scanners. There are also issues such as **ensuring safety in case of powerplant or rotor failure**.
- Aircraft protection from **cyberattacks** is another area of focus.
- A third area is in navigation and flight safety and the use of technology when operating in difficult terrain, unsafe operating environments and also bad weather.

How did it begin?

- There is general agreement that the eVTOL world is moving forward based on the spark provided by NASA researcher Mark D. Moore who came up with the concept of a personal (one man) air vehicle while working towards his doctorate.
- Called the “Puffin” and thought of in 2009-10, it was about four metres tall and with a wingspan of 4.4 metres.
- It had 60hp electric motors that powered two propellers. Its other specifications included a four-point landing gear, a weight of 272kg, 45kg of batteries, a pilot payload of about 90kg, fetching it a total weight of 407 kg.
- Its top speed was under 245 kmph with a range of about 80km. A prototype was unveiled in 2010 and the concept was discussed at a conference on aeromechanics in 2010.

Are there any big players now?

- Since then there have been a number of ideas by industry, such as the **Volocopter VC1 from Germany** and the **Opener BlackFly from the U.S.**
- The top aircraft manufacturers, **Airbus and Boeing, have also joined the race**.
- Airbus unveiled its prototype, **Vahana Alpha One or the Airbus Vahana** (from the Sanskrit Vahana), at the Paris Air Show in 2017. It was pitched as a “cost-comparable replacement for short-range urban transportation” based on a fan-run tilt-wing design.
- A company, Lilium, started in 2015, which claims to be the “developer of the first all-electric vertical take-off and landing eVTOL jet”, says that it is moving towards developing prototypes “designed to extract over 100kW of power from a system weighing just over 4kg” which gives an idea of the advancements.
- Its Lilium Jet theory has been designed for concepts such as private flights, six-seater passenger flights, or no seating for the zero-emissions logistics market.
- China, Israel and the U.K too have programmes to look out for.

What about certification?

- Some companies have concepts that are aimed at dual certifications by regulatory agencies in the western world. In March this year, the Federal Aviation Administration (FAA) and the United Kingdom Civil Aviation Authority announced being engaged in discussions focused on “facilitating certification and validating new eVTOL aircraft, their production, continued airworthiness, operations, and personnel licensing”.
- Both bodies also highlighted the need to maintain very high safety standards. Further to this, eVTOL technology is to use existing regulatory frameworks despite being in the form of new and emerging technologies.

- The FAA has clarified that it plans to certify eVTOLs as powered-lift aircraft (an existing category) but in future, “develop additional powered-lift regulations” for innovation in operations and pilot training. It plans to use a “special class” process in 14 CFR 21.17(b) to oversee the unique features of emerging powered-lift models.
- EVTOL certification is also complex because of planned operations within urban areas, new battery systems and the need for higher levels of automated redundancy.

How has the progress been?

- The Paris summer Olympics 2024 is expected to be the big moment. France is working on two dedicated routes to transport passengers.
- Landing and takeoff zones at the Pontoise-Cormeilles-en-Vexin hub are being tested on parameters such as noise levels, integration of drones and eVTOLs with existing air traffic, battery charging and also maintenance.

How will it be in India?

- Blade is an urban air mobility company that aims to connect places that are heavily congested and also not well connected by air services.
- The concept of ‘Advanced Air Mobility’ comes in, i.e., connecting places through vertical aircraft and thus skipping road travel. This is being done now by helicopters, but eVTOLs will step into this space.
- Blade U.S. is currently working with electric vertical aircraft (EVA) manufacturers such as Beta Technologies and has partnered with them for an all electric fleet by the year 2024.
- eVTOLs are noise free, have a zero carbon footprint and are more affordable. Beta technologies and other EVA manufacturers have been extended an invitation to manufacture in India.

What is the value of the market?

- The global market for eVTOLs was put at \$8.5 million in 2021 and is to grow to \$30.8 million by 2030.
- The demand will be on account of green energy and noise-free aircraft, cargo carrying concepts and the need for new modes of transport.
- The UAM market is expected to expand at a compound annual growth rate of 25% between 2018-25. By 2025, it is anticipated to be a \$74 billion market. This includes the eVTOLs market since UAM ideally focuses on the use of eVTOLs.

Project to track small fishing vessels pending since 26/11

(GS Paper 3, Internal Security)

Why in news?

- As the Quad grouping looks to **track and address illegal, unreported and unregulated (IUU) fishing** in the Indo-Pacific, an ambitious effort to install the **satellite-based Vehicle Monitoring System (VMS) for small fishing vessels (less than 20 metres)** across the country’s coastline is still to be rolled out.
- Despite pilot studies being conducted, the project, conceived in the aftermath of the 26/11 Mumbai attacks, remains stuck.

Causes for delay:

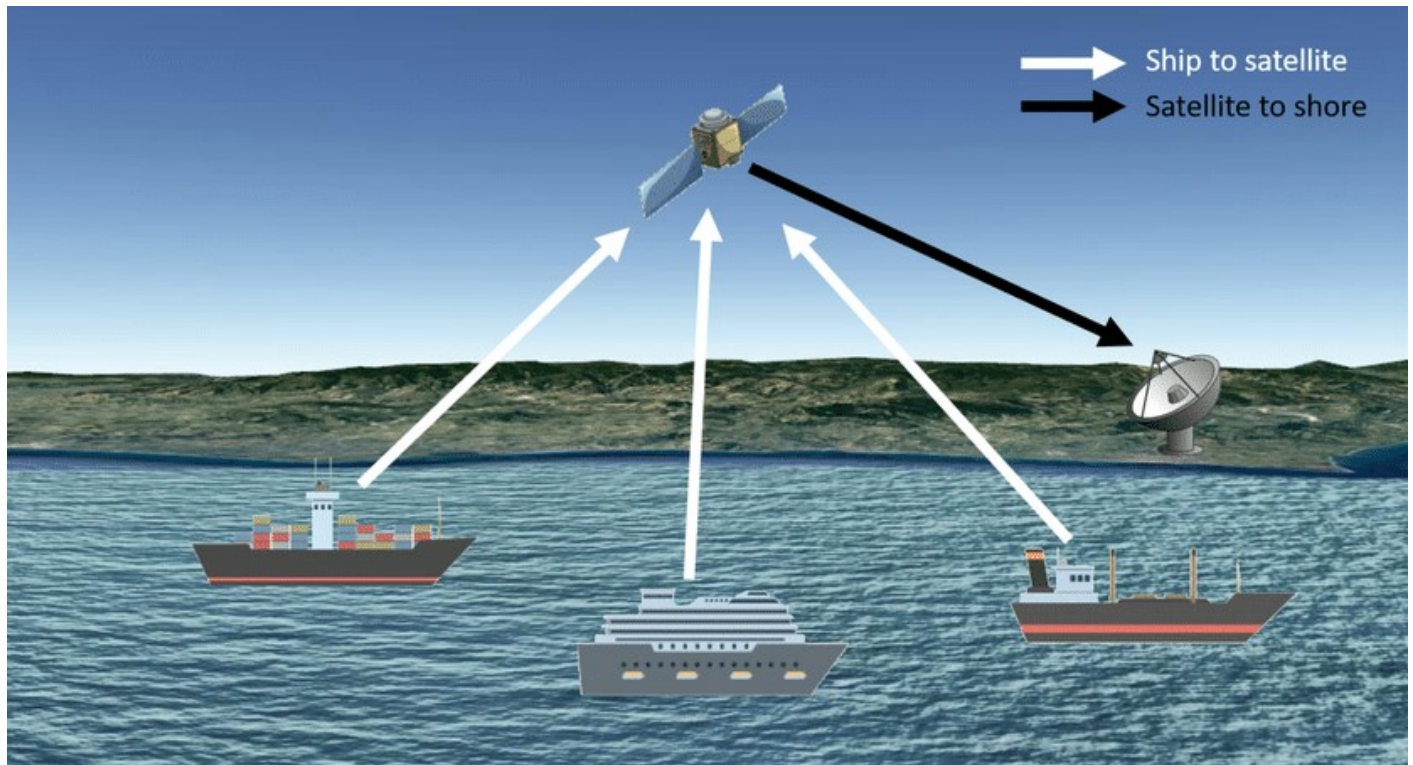
- Fishermen don’t want to get tagged as they do not want any of their illegal activities recorded and they are sceptical that others will get to know of where there is good catch.
- Second is that **fishing is a State subject** and there are local politics involved.
- There is no legislation to force fishermen to install the transponders and efforts by the Ministry of Fisheries to table the Indian Marine Fisheries Bill, 2021 which covers this has repeatedly been delayed due to the opposition from the States and fishermen.

Indo-Pacific Maritime Domain Awareness (IPMDA) initiative:

- The Quad grouping, comprising **India, Australia, Japan and the U.S.**, announced at the Tokyo summit an ambitious **Indo-Pacific Maritime Domain Awareness (IPMDA) initiative**.
- **It aims to track “dark shipping”** and to build a “faster, wider, and more accurate maritime picture of near-real-time activities in partners’ waters” **integrating three critical regions in the Indo-Pacific; the Pacific Islands, Southeast Asia, and Indian Ocean Region (IOR).**

Regulations globally on IUU fishing:

- There are two main regulations globally on IUU fishing, the **Cape Town Agreement (CTA)** and the **Agreement on Ports State Measures (PSMA)** and **India is**, so far, **not a signatory to both agreements**.



Regulation in India:

- The **Automatic Identification System (AIS)** is for **bigger ships**, which was made compulsory for **all vessels above 20 metres** after 26/11 by the National Committee on Strengthening Maritime and Coastal Security (NCSMCS).
- For smaller fishing vessels, **Vehicle Monitoring System (VMS)**, which is slightly different from AIS.
- **AIS is a broadcast mode** which anyone can receive while **VMS is a proprietary system** and one can't receive unless the data is given. In terms of functioning VMS has a transponder which relays data via a satellite.

Trails in collaboration with ISRO:

- Trials were conducted on tracking of vessels under 20 m first fitted on small patrol boats in Mumbai followed by trials on fishing vessels both of which were successful.
- Further a pilot was carried out on a small number of fishing vessels along the coasts of Gujarat and Tamil Nadu.
- The trials were conducted in association with the Indian Space Research Organisation (ISRO) on one of their communication satellites and the transponders have advanced features like weather alert and so on but there has been no progress.
- Trials were again conducted in 2021 in collaboration with a start-up which were also successful. But there has been no movement since.

Growing concern on IUU

- There has been growing concern and action on IUU fishing that depletes fish stocks, destroys marine habitats, puts fishermen at disadvantage and impacts coastal communities, especially in developing countries.
- In addition, there is also the issue of subsidies for fishermen. It is believed that more the subsidies given, more the illegal fishing, and there has been a campaign across the world against subsidies. India has been under pressure over this.

Way Forward:

- World over fishing vessels are supposed to have VMS which does not only give the position identity, the fishing vessel is also supposed to feed in the volume of the catch and where was it caught which tackles the issue of IUU.

NSEFI's Pan-India Rooftop Solar Awareness Campaign

(GS Paper 3, Environment)

Why in news?

- Recently, Union Minister of State for New and Renewable Energy launched the Pan-India Rooftop Solar Awareness Campaign in an event at Bidar, Karnataka.

Significance:

- Rooftop Solar provides an opportunity to the common person to make his contribution towards Global Warming & Climate Change.
- This campaign titled “GHAR KE UPAR SOLAR IS SUPER” shall aim at mobilizing local government, citizens, RWAs, and Municipalities to spread awareness of Solar Rooftop.

Key Highlights

- 1** The Ministry is working towards achieving target of 500 GW of non-fossil by 2030
- 2** The rooftop solar will play major role and Tier-2 & Tier-3 cities offer maximum potential in achieving this target.
- 3** Karnataka alone has the potential of 1 GW rooftop solar
- 4** The MNRE is providing 40% of subsidy for households to install solar.

About Pan India Rooftop Awareness Program:

- NSEFI, with the support of the German Solar Association (BSW) and the German Federal Ministry of Economic Cooperation and Development (BMZ) under the Sequa KVP Programme, is launching a 3 year long, Pan India Rooftop Awareness Program aimed at increasing awareness of Solar Rooftops among 100 Indian towns and cities, especially tier 2 and tier 3 towns/cities.

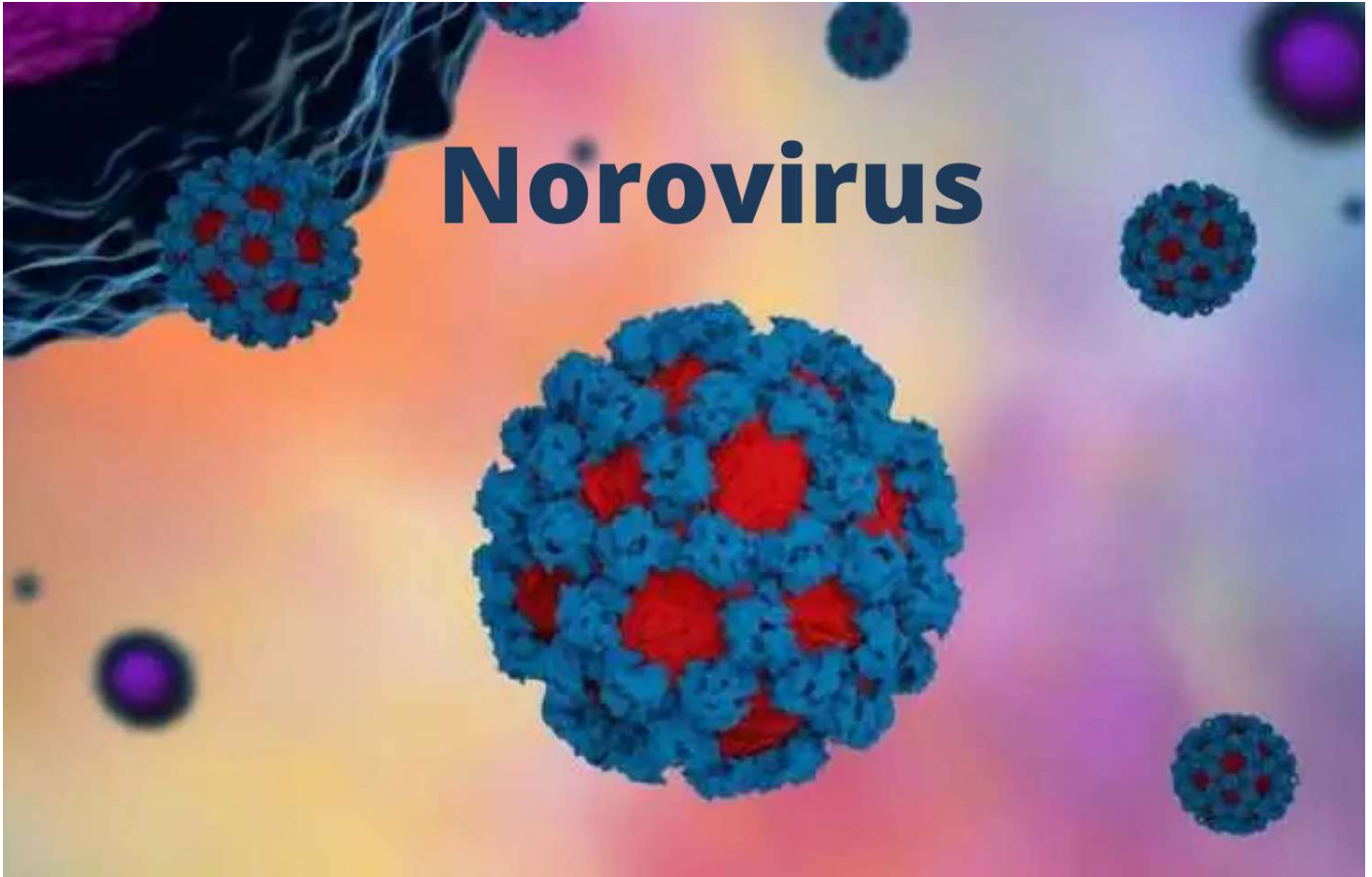
About National Solar Energy Federation of India (NSEFI):

- National Solar Energy Federation of India (NSEFI) is an umbrella organization of all solar energy stakeholders of India which works in the area of policy advocacy and is a National Platform for addressing all issues connected with solar energy growth in India.
- It consists of leading International, National and Regional companies and includes Solar Developers, Manufacturers, EPC Contractors, Rooftop Installers, System Integrators, and Balance of Plant suppliers and Manufacturers, Small and Medium Enterprises and works in a complimentary manner with the Central and State Governments for achieving India's National Solar Target of 100 GW by 2022 & Renewable Target of 450 GW by 2030.

Norovirus

Why in news?

- At least two cases of norovirus have been found in Thiruvananthapuram among lower primary school students.
- The infection, which causes vomiting, diarrhoea and fever as symptoms, was diagnosed after samples were tested at a government analytical lab. More samples have been sent for examination. So far, it is believed that students got food poisoning from mid-day meals distributed at the schools.



What is norovirus?

- Norovirus is a **highly contagious virus** that is also sometimes referred to as the ‘**stomach flu**’ or the ‘**winter vomiting bug**’.

Transmission:

- It can be transmitted through contaminated food, water, and surfaces.
- The primary route is oral-faecal.
- It is similar to diarrhoea-inducing rotavirus and infects people across age groups.
- Disease outbreaks typically occur aboard cruise ships, in nursing homes, dormitories, and other closed spaces.
- According to the WHO, emerging evidence suggests that “norovirus infection is associated with intestinal inflammation, malnutrition and may cause long-term morbidity”.

What are the symptoms?

- The initial symptoms of norovirus are vomiting and/or diarrhoea, which show up one or two days after exposure to the virus.
- Patients also feel nauseous, and suffer from abdominal pain, fever, headaches and body aches. In extreme cases, loss of fluids could lead to dehydration.

What precautions can one take?

- One may get infected multiple times as the virus has different strains. Norovirus is resistant to many disinfectants and can withstand heat up to 60°C. Therefore, merely steaming food or chlorinating water does not kill the virus. The virus can also survive many common hand sanitisers.
- The basic precaution is also the most obvious repeatedly washing hands with soap after using the lavatory or changing diapers. It is important to wash hands carefully before eating or preparing food.
- During outbreaks, surfaces must be disinfected with a solution of hypochlorite at 5,000 parts per million.
- The US Centre for Disease Control and Prevention suggests that those infected should avoid contact with others and avoid preparing food for others while sick and for two days after symptoms stop.

What is the treatment?

- The disease is self-limiting. The infection, even though it takes a lot out of the patient, normally lasts only two or three days, and most individuals who are not very young, very old, or malnourished can ride it out with sufficient rest and hydration.
- **Diagnosis is done by real-time reverse transcription-polymerase chain reaction.** No vaccines are available for the disease.