

CONTENTS

<u>Environment and Ecology</u>
1. Arsenic Poisoning
2. Endosulfan
3. Gaj Yatra
4. Indian Vulture/ Indian Griffon/Long-billed Griffon
5. Natural capital in the 21st century
6. Thoothukudi Violence
7. Dirty socks, algae behind Taj Mahal discolouration
8. Gravity Recovery and Climate Experiment (GRACE)
<u>Health Issues</u>
1. Chikungunya
2. 'Nipah' virus (NiV)
3. Thalassemias
4. Vitamin D /Sunshine Vitamin
5. WHO launches 'REPLACE' to eliminate trans-fat in foods
6. India rejects U.S. request on medical device price caps
7. Eat less saturated, trans fats to curb heart disease: WHO
<u>Science and Technology</u>
1. Insight Mission
2. When NECTAR turned poison for bamboo
3. Problems with a DNA registry

Environment and Ecology

1. Arsenic Poisoning

Context

- An estimated 10 million people in nine districts of West Bengal drink arsenic-laden groundwater.

Stats

- Scientists discovered that the shallow groundwater in these districts had high levels of the mineral: up to 1,000 micrograms (mcg) per litre in places.
- The World Health Organisation's (WHO) prescribed safe level is 10 mcg per litre.

Mass poisoning

- Today, an estimated 10 million people in nine districts in West Bengal drink arsenic-laden groundwater.
- When West Bengal's problem first attracted international attention in 1995, a researcher from the University of Colorado compared its scale with the Chernobyl disaster.
- But despite the grave warnings from international bodies like the WHO, the West Bengal government has moved excruciatingly slowly to tackle the crisis.
- So even though multiple technologies to filter arsenic from groundwater are there, awareness of arsenic's ill-effects remains low. So, people continue drinking toxic water, even when alternatives exist.

Problems it could give rise to

When such water is consumed for years, either directly or through the food chain, the mineral damages organs like the skin, kidneys and lungs.

- The most visible symptom in early years is a classic blotchy pattern on the skin, a condition called raindrop pigmentation.
- If people showing such pigmentation don't switch to safer water, they develop hyperkeratosis — dark crusts on their palms and soles, which can get infected and make it painful to work.
- Eventually, the skin can turn cancerous.
- Simultaneously, arsenic can destroy the kidneys and liver tissue, cause conjunctivitis and affect the lungs, just as heavy smoking does. There are few organs that arsenic spares.

How it effects children?

- The children seem symptom-free. Arsenic is a silent killer; it takes years for keratosis to show in adults and even longer in children.
- Studies also show that arsenic-exposed children have lower IQ compared to control groups.

How can this be controlled?

- UNICEF consultants were of the opinion that public outreach ought to be the foundation of the government's mitigation strategy.
- This would mean not just painting wells, but also holding door-to-door campaigns, conducting street plays and distributing flyers about the danger of using contaminated tube wells.
- Unless this happened, patients would not go to government-run arsenic clinics or switch to safe tube wells.

Other Measures

- Alternate arrangement for supply of arsenic free water to the affected populace and providing arsenic removal plants.
- **Reverse osmosis and electro dialysis** (also called electrodialysis reversal) can remove arsenic.
- Technological options to combat arsenic menace, in groundwater, to ensure supply of arsenic free water, in the affected areas can be

1. in-situ remediation of arsenic from aquifer system,
 2. ex-situ remediation of arsenic from tapped groundwater by arsenic removal technologies,
 3. use of surface water source as an alternative to the contaminated groundwater source,
 4. tapping alternate safe aquifers for supply of arsenic free groundwater or combination of above techniques.
- **Subterranean Arsenic Removal (SAR) Technology** can be used

Endosulfan

- It is a widely-banned pesticide with hazardous effects on human genetic and endocrine systems.
- Endosulfan pesticide was used widely on crops like cashew, cotton, tea, paddy, fruits and others until 2011, when the Supreme Court banned its production and distribution.

Health effects

- The higher prevalence of cancer in younger ages, neurobehavioral disorders, congenital malformations in female subject and abnormalities related to male reproductive system.
- People, especially newborns, have suffered deformities, health complications and loss of family members due to exposure to the agrochemical.

Environment

- In case of environment, open spraying of Endosulfan causes a disaster on the biodiversity of the area. It leads to decline in plant diversity particularly for native species. Fishes are worst hit.

International

- THE UN has recommended a ban on endosulfan in 127 countries.
- The Stockholm Convention on Persistent Organic Pollutants in 2011 added it in list of banned substances and phasing it out as an agrichemical.

Gaj Yatra

- ‘Gaj Yatra’, a nationwide campaign to protect elephants, was launched on the occasion of World Elephant Day. The campaign is planned **to cover 12 elephant range states**.
 - Elephant Range States –
 - ✓ Tamil Nadu, Kerala, Karnataka, A.P
 - ✓ Assam, Arunachal Pradesh, Meghalaya, Nagaland
 - ✓ West Bengal, Jharkhand, Odisha
 - ✓ Uttarakhand.
- The 15 months campaign will be **led by the Wildlife Trust of India (WTI)**. The campaign aims to create **awareness about elephant corridors to encourage free movement in their habitat**.

World Elephant Day:

- World Elephant Day is an annual global event celebrated **across the world on August 12**, dedicated to the preservation and protection of elephants.
- The goal of World Elephant Day is **to create awareness about the plight of elephants and to share knowledge and positive solutions for the better care** and management of captive and wild elephants.
- World Elephant Day is celebrated to focus the attention of various stakeholders in supporting various conservation policies to help protect elephants, including improving enforcement policies to prevent illegal poaching and trade in ivory, conserving elephant habitats, providing better

treatment for captive elephants and reintroducing captive elephants into sanctuaries.

- **African elephants are listed as “vulnerable” and Asian elephants as “endangered” in the IUCN Red List of threatened species.** As per the available population estimates, there are about 400,000 African elephants and 40,000 Asian elephants.

Indian Vulture/ Indian Griffon/Long-billed Griffon

- Gyps indicus breeds in south-east Pakistan and peninsular India south of the Gangetic plain, north to Delhi, east through Madhya Pradesh, south to the Nilgiris, and occasionally further south.
- IUCN: critically endangered

Threat

- The anti-inflammatory drug diclofenac, used to treat domestic livestock, has been identified as the cause of mortality, with renal failure resulting in visceral gout in the vast majority of examined vultures

Conservation

- **SAVE (Saving Asia's Vultures from Extinction)** has developed the concept of Vulture Safe Zones; areas (with a minimum of 100 km radius, equating to 30,000 km²) around important vulture breeding colonies, where education and advocacy efforts are focused on eliminating the use of diclofenac and other vulture-toxic drugs.
- The **Indian government has now passed a bill banning the manufacture of the veterinary drug diclofenac** that has caused the rapid population decline across the Indian subcontinent
- **Captive breeding efforts** are ongoing
- There are currently 12 provisional **Vulture Safe Zones being established** in India, Nepal, Pakistan and Bangladesh

- **Satellite tagging has been employed on Asian Gyps vultures** to improve understanding of their movements and range use so as to aid the development of conservation strategies for the genus

Natural capital in the 21st century

The cost of air pollution: strengthening the economic case for action Report

It is a joint study by World Bank and University of Washington

- In terms of welfare losses because of air pollution, India ranks second after China at \$505.1 billion, or 7.69% of its gross domestic product (GDP), in 2013
- India reported the highest loss in labor output in 2013 owing to air pollution globally at \$55.39 billion (2011 PPP-adjusted), or 0.84% of its GDP.
- Adding welfare costs and costs of lost labour due to air pollution puts India's GDP loss at more than 8.5% in 2013.

Air pollution kills more people than tobacco, alcohol or drug use or unsafe sex in most countries. At 10.1% of total deaths globally, air pollution ranked fourth among the leading fatal health risks after metabolic risks, dietary risks and tobacco smoke.

Natural capital

- It can cover entire ecosystems such as fisheries and forests, besides other hidden and overlooked services — for example, the regeneration of soil, nitrogen fixation, nutrient recycling, pollination and the overall hydrological cycle.
- Valuing such ecosystems can be challenging, with their market value often termed as zero.

- When pollution happens, it is actually a depletion of our natural capital as, for example,
 - acid rain damages forests and
 - industrial seepage affects water quality.

In a modern economy, the challenge is to estimate such depreciation to natural capital.

GDP's exclusion of Natural Capital

- GDP computations indicate the economic activity in a country, with rising GDP growth rate often leading to international prestige.
- However, such estimates often **exclude the variations in natural capital by assuming them to be constant and indestructible.**
- Such natural capital is often self-generating (water, clean air) but needs to be handled in a sustainable way in order to avoid depletion.
- India having a GDP of \$2.65 trillion in nominal terms has failed **to take into account the externalities of such economic growth.**

Environmental Kuznets Curve

- It is the 'relationship between GDP per capita and the concentration of Sulphur dioxide in the local air' is an inverted U curve.
- Such a relationship leads to the postulation that people from 'developing countries can't place a weight on natural environment' and should consider pollution as an acceptable side-effect of GDP growth.
- So now many economists are pushing for an "environmental Kuznets curve".

Issue in its usage

- This inverted U curve is found primarily for **local pollutants that lead to short-term damages (sulphur, particulates) and not for pollutants that lead to long term and dispersed costs (carbon dioxide).**
- In addition, the inverted **U curve hides systemic consequences of emissions.**

Hence Natural Capital should be treated as a necessity.

Problems it could give rise to

- When economic growth leads to the destruction of forests, wetlands and woodlands for agriculture, mining or even urban expansion, it is typically the **poorest of the traditional dwellers who suffer**.
- Ecological collapse can soon come, examples being the **Darfur region in Sudan and countries in the Horn of Africa**. All were subject to rapid socio-economic decline.

Attempts in the Past

- In 2009, the Centre announced that it would publish a “green GDP” that would include the environmental costs of degrading and depleting our forests, grasslands and natural stock.
- An expert programme, sponsored by the Ministry of Statistics and Programme Implementation, released a Compendium of Environment Statistics 2013.
 - The group recommended that **India shift to a system of measuring comprehensive national wealth**, which includes items such as human capital, capital equipment and natural capital.
 - However, implementation of such well-founded recommendations has been constrained by the **lack of micro-level data on capital formation, particularly in a natural context**.
- The 12th Five Year Plan undertook groundwater resource mapping at the national level, a similar focus is essential for data on land usage, forests and mineral wealth

Way forward

- India should seek to publish “green GDP” figures that take into account depreciation of natural capital stock due to economic exploitation and environmental degradation.

- It can follow the template provided by the **UN's System of Environmental-Economic Accounting**.
- Adapting our national accounts in line with this framework will help in **incorporating the value of the environment in our growth while helping us to focus on developing a feasible transition path to a green economy**.

Thoothukudi Violence

Context

- The rally in which thousands of local people participated under the banner of 'Anti Sterlite Movement', turned violent with sections of protesters allegedly setting fire to vehicles including those of Police

Company and Manufacturing Units

- Sterlite Copper is the Indian copper-producing unit of Vedanta, Ltd., a subsidiary of Vedanta Resources, the UK-based mining and metals conglomerate.
- Vedanta specialises in mining and refining non-ferrous metals – copper, zinc and aluminium.
- It is mainly involved in mining copper in Tuticorin. The city unit includes a smelter, a refinery, a phosphoric acid plant, a copper rod plant and three captive power plants. The plant was set up in 1997

Trigger

- The protests flared after the company announced plans to expand the plant and increase production of copper from the current 4 lakh tonnes to 8 lakh tonnes annually

Environmental Impact

- Copper production, including mining, smelting and refining, is a hazardous industry that produces toxic byproducts like lead, arsenic and sulphur oxides that **adversely impact water, soil and air quality**.

- These effects extend to several tens of kilometres around the source.
- Environmental regulations that aim to reduce emissions require operational changes and make production more expensive and less competitive
 - In 2005 the company said that its Tuticorin smelter had one of the lowest costs of production of all copper smelting operations worldwide
- National Environmental Engineering Research Institute (NEERI) and the TNPCB have found evidence that Sterlite contaminated the groundwater, air and soil with its effluents and also violated standards of operation.

Violation of Environmental Norms

- The plant has faced legal questions right from its inception when Sterlite Industries sought and received environmental clearance from the Ministry of Environment, Forest and Climate Change for setting up of the plant that was to produce 1200 tonnes of copper every day.
- **No public consultations were conducted despite provisions of the Environmental Impact Assessment Notification, 2006** necessitating public hearings in case of setting up of copper smelters.
- The Sterlite Copper complex lies **within zone of sensitive marine ecosystem**. This violates the conditions attached to the 'Consent to Establish' issued by the Tamil Nadu Pollution Control Board (TNPCB).
- The board also **reduced the width of the mandatory green belt around Sterlite** from 250 metres to 25 at Vendanta's request.
- pollutants from the factory were seeping into the ground water

Health Issues

- High prevalence of asthma, pharyngitis, sinusitis and other respiratory tract infections, all proxies for the presence of harmful gases and particulate irritants in the lower atmosphere.
- Headache, coughing and choking due to smoke emanating from the plant.

Current Status

- The plant was closed on March 29 for 15 days for “maintenance work”.
- But it will remain shut until at least June 6 as Tamil Nadu pollution control board will not allow it to operate due to alleged non-compliance with environmental rules.
- Owing to the unrest, the pollution board has also refused to renew its initial 25-year license, which expires this year.

Dirty socks, algae behind Taj Mahal discolouration

In news

- **Unwashed socks worn by visitors and rampant algae** seem to turn the Taj Mahal from its natural white to yellow, brown and green, the Archaeological Survey of India (ASI) said to Supreme Court
- It was not possible to distribute socks to all visitors. Many went wearing their own socks.

SC

- Not convinced with argument it asked the ASI **how algae managed to reach the top parts of the mausoleum** where patches of discoloration were seen.
- The court said the problem was not with algae but the fact that the ASI was unwilling to accept that they were not doing enough to conserve the monument.

Natural Causes

- The Taj Mahal is, after all, a 360-year-old monument, so some discoloring is to be expected.
- Marble does not exist in a pure form, so the marble in the **Taj Mahal is full of minerals which become oxidized over time. Oxidization leads to the browning** of these minerals, resulting in brown splotches on the beautiful mausoleum.
- **Rain also adversely affects the monument**, slowly weathering it down, leading to chipping and cracking.

- **Iron dovels were installed to repair the marble slabs on the building.** The iron in these dovels naturally became rusted, and a new layer of this rust was then deposited onto the marble of the Taj.

Environmental Neglect

- **Trees have been felled left, right and center in** and around Agra as the price for ‘modern development’.
- **Agra lies in a semi-arid zone, and the temperatures can reach 50 degrees Celsius.** Without the natural obstruction of trees, the heat waves that regularly plague the plains of North India are free to wreak havoc on whatever stands in their way.
- **Burning municipal waste, cow dung and other forms of waste** releases particulate matter into the sky. Agra and its neighboring areas have a high rate of particulate matter for this very reason.

"explosive breeding" of the pests

- **The dumping of waste in the Yamuna led to the stagnation of the river and the consequent “explosive breeding” of the insect,** which is a “biological indicator of water quality and localised water pollution.”
- An invasion of the insect called **Chironomus Calligraphus** (Geoldichironomus) is turning the Taj Mahal green
- Yamuna has become so stagnant that **fish that earlier kept insect populations in check are dying.** This allows pests to proliferate in the river
- The stains the bugs leave on the marble are washable and workers from the Archaeological Survey of India (ASI) have been trying to scrub the walls clean, but **frequent scrubbing can take the sheen off the marble.**

NASA Satellites Reveal Major Shifts in Global Freshwater

- In a first-of-its-kind study, scientists have combined an array of **NASA satellite observations of Earth with data on human activities** to map locations where freshwater is changing around the globe
- The study finds that Earth's wet land areas are getting wetter and dry areas are getting drier due to a variety of factors, including human water management, climate change and natural cycles.

India

- India is among the hotspots **where overuse of water resources** has caused a sharp decline in the availability of freshwater
- **Areas in northern and eastern India, West Asia, California and Australia are among the hotspots** where overuse of water resources has caused a serious decline in the availability of freshwater,
- **In northern India, groundwater extraction for irrigation of wheat and rice crops** has led to depletion, despite rainfall being normal throughout the period studied
- **The fact that extractions already exceed recharge during normal precipitation** does not bode well for the availability of groundwater during future droughts

The team used 14 years of observations from the Gravity Recovery and Climate Experiment (GRACE) spacecraft mission

Gravity Recovery and Climate Experiment (GRACE)

- It was a joint mission of NASA and the German Aerospace Center.
- By measuring gravity anomalies, GRACE showed how mass is distributed around the planet and how it varies over time.
- Data from the GRACE satellites are **an important tool for studying Earth's ocean, geology, and climate.**

Health Issues

Chikungunya

- It is an infectious viral disease which is transmitted to humans by mosquitoes infected with the virus.

Piperazine

- Researchers at the Indian Institute of Technology (IIT) in Roorkee -working to develop a cure for Chikungunya -have discovered the anti-viral properties of the drug piperazine, and determined the mechanism to combat the disease.
- Piperazine is a drug commonly used in **deworming treatments against roundworm and pinworm.**
- Using X-ray crystallographic technique, in combination with computational biology and fluorescence techniques, the researchers found that piperazine binds itself well with the hydrophobic pocket on the alphavirus capsid protein.
- This pocket is the key to the replication of the virus and its spread inside a host.
- This inhibition of this pocket prevents budding and spread of the virus and can help in treating the virus effectively using existing drugs

'Nipah' virus (NiV)

- Nipah Virus is an emerging infectious disease that broke out in Malaysia and Singapore in 1998 and 1999. It first appeared in domestic pigs and has been found among several species of domestic animals including dogs, cats, goats, horses and sheep. The infection is also known to affect human beings.
- The organism which causes Nipah Virus encephalitis is an **RNA or Ribonucleic acid virus of the family Paramyxoviridae, genus Henipavirus, and is closely related to Hendra virus.**

- Nipah virus infection gets its name from the village in Malaysia where the person from whom the virus was first isolated succumbed to the disease.
- The virus has been listed in the World Organisation for Animal Health (OIE) Terrestrial Animal Health Code and must be reported to the OIE (OIE Terrestrial Animal Health Code).

How does Nipah spread or gets transmitted?

- The **disease spreads through fruit bats or ‘flying foxes,’** of the genus Pteropus, who are natural reservoir hosts of the Nipah and Hendra viruses.
- The virus is present in bat urine and potentially, bat faeces, saliva, and birthing fluids. Presumably, the first incidence of Nipah virus infection occurred when pigs in Malaysian farms came in contact with the bats who had lost their habitats due to deforestation.
- Furthermore, transmission between farms may be due to fomites – or carrying the virus on clothing, equipment, boots, vehicles.

Symptoms of the Nipah infection

- Typically, the human infection presents as an encephalitic syndrome marked by fever, headache, drowsiness, disorientation, mental confusion, coma, and potentially death.
- During the outbreak in Malaysia, up to 50 per cent of clinically apparent human cases died.
- There is no specific treatment for Nipah Virus. The primary treatment for human cases is intensive supportive care.

Habitat loss may have triggered Nipah outbreak

- According to a report by the World Health Organization, there is “strong evidence” that the emergence of bat-related viral infections can be attributed to the loss of the animal’s natural habitats.
- As the flying fox [fruit bat] habitat is destroyed by human activity, the bats get stressed and hungry, their immune system gets weaker, their virus load goes up and a lot of virus spills out in their urine and saliva

Environmental stress

- In the case of the Hendra virus — the Nipah equivalent in Australia — scientists found that when fruit bats are stressed (through habitat fragmentation, habitat reduction and physiological stress), the percentage of bats infected with the virus increases drastically, increasing the likelihood of passing it to humans through horses.
- According to a study in Malaysia, rapid urbanization of bat-rich rainforests contributed to the emergence of Nipah virus there: the regions most adversely affected were those that suffered from maximum deforestation
- Forest fragmentation and hunting bats for food also bring them closer to humans and is often an important cause of disease transmission

Can bat culling help?

- Culling bat populations may seem like an easy solution — and has been tried in Australia — but studies warn that instead of reducing the outbreak of such zoonotic diseases, it could cause even more damage, chiefly ecological.
- about a quarter of the more than 1,300 bat species seen worldwide feed on fruit and nectar and are crucial pollinators (of fruit trees, including mango, guava and banana), helping maintain genetic diversity in agricultural systems.
- They are also important seed dispersers; other bat species help bring rodent and insect numbers under control.

Thalasseмииs

- Thalasseмииs is an inherited blood disorder characterised by less oxygen-carrying protein (haemoglobin) and fewer red blood cells in the body than normal.
- Symptoms include fatigue, weakness, paleness and slow growth.
- Thalasseмииs are genetic disorders inherited from a person's parents

India

- India has the highest number of thalassaemia majors and carriers (or those who are asymptomatic).
- It is estimated that there are more than 100,000 thalassaemia majors in the country or an average prevalence rate of 3-4% carriers in the general population.
- Each year, there are 10,000 children born with thalassaemia major.

The two types of thalassaemia are alpha thalassaemia and beta thalassaemia.

- In alpha thalassaemia, having one faulty gene will cause little or no effect to a person.
 - Two faulty genes are associated with mild anaemia.
 - Three mutated genes result in haemoglobin H disease that needs regular blood transfusions to treat chronic anaemia.
 - Unborn babies with four faulty genes are unlikely to survive pregnancy.
- Beta thalassaemia also has different forms:
 - **Beta Thalassaemia Major, also called BTM**, requires lifelong regular blood transfusions.
 - **Beta Thalassaemia Intermedia is also known as BTI** or non-transfusion dependent thalassaemia or NTDT. This is a milder form of the condition and the severity will differ between individuals, from mild anaemia to the need for regular blood transfusions.

Issues

- patients require lifelong blood transfusion, iron chelation therapies and other treatment
- There is still no cure other than a bone marrow transplant.
- As this has to be done in early childhood, it is not a workable cure as yet for adults.

- Thalassaemia causes a significant economic burden on the country due to rising health care and drug expenses.
- Given the genetic nature of the disease, it is in India's best interests to focus on prevention and a cure.

Research

- A biotechnology company in the U.S., Bluebird Bio, has been conducting clinical studies to investigate the potential for LentiGlobin gene therapy as a final cure for transfusion-dependent β -thalassaemia (TDT).
- In April 2018, the company announced positive results in clinical studies that used this gene therapy. Here, the 22 study patients did not need blood transfusions.

Cost is a barrier

- the development has raised the hopes of patients and families, the biggest obstacle is its cost. Most patients in India cannot pay for such expensive treatments in the absence of any government support and the complete lack of medical insurance for genetic disorders.

Various Initiatives

- The Department of Biotechnology (DBT) has constituted a task force ("Stem Cell Research and Regenerative Medicine") to encourage translational research
- On the regulatory front, there are clear guidelines for "Stem Cell Research and Therapy" that have been formulated jointly by the DBT and the Indian Council of Medical Research.
- The new Drugs and Clinical trials Rules, 2018 encourage and motivate clinical research for orphan diseases

Way forward

- India has no dearth of talented and ethical medical researchers and doctors who can engage in gene therapy research. So, the government, medical

research institutes and hospitals need to start developing low-cost gene therapies for thalassaemia.

Vitamin D /Sunshine Vitamin

- Vitamin D is formed in our skin under the influence of ultra-violet B (UVB) rays that are found in sunlight.

Stats

- About 70% of urban Indians are deficient in this vitamin.

Importance

- Vitamin D controls the absorption of calcium which is essential for the growth and maintenance of bones and muscles.
- Its deficiency affects both children and adults, especially among populations that are starved of sun exposure, causing bone diseases such as rickets in children, and osteomalacia and osteoporosis in adults.
- In addition, low vitamin D has been found to be associated with conditions such as asthma, infections, auto-immune disorders, depression and even cancer.

Issue Area

- dietary sources of the vitamin are fatty fish such as salmon and tuna. However, Indians rarely consume these fish
- Indians rarely consume these fish, and typically demonstrate 'sun-fleeing behaviour', especially in the urban areas, in order to avoid the heat and skin darkening
- Atmospheric pollution too makes it difficult for UV rays to reach the earth's surface which further aggravates the problem

Overcoming vitamin D deficiency

- There is a need for awareness about the need for sunlight exposure between 11 a.m. and 3 p.m. However, it is often impractical to implement this for the typical, office-going urban Indian; atmospheric pollution is also a barrier.
- Food fortification or enrichment is the process of adding micronutrients (essential trace elements and vitamins) to food.
- In the United States, fortification of milk with vitamin D was started as far back as 1933 which reduced the prevalence of several types of bone disease dramatically

Steps taken by Govt

- Recognising the benefits of fortification, the Food Safety and Standards Authority of India, in late 2016, set standards and safety guidelines for fortifying milk and edible oil with vitamins D and A.
- States such as Himachal Pradesh, Gujarat, Rajasthan, Madhya Pradesh and parts of Haryana have already introduced fortified edible oil in the public distribution system and mid-day meal programmes
- well-known dairy chains in India have also initiated the fortification of milk.

Way forward

- Raising awareness about the benefits of vitamin D fortified food in building better bones is an important component of these efforts.
- India already has an impressive record with iodine-fortified salt, which has virtually eradicated goitre and cretinism. In a similar effort to promote widespread use of vitamin D fortified milk and edible oil can result in a marked reduction in the prevalence of vitamin D deficiency across India.

WHO launches 'REPLACE' to eliminate trans-fat in foods

Context

- The World Health Organization (WHO) has launched a comprehensive plan to eliminate industrially-produced artificial trans fats from the global food supply by 2023.

Source

- Industrially-produced trans fats are contained in hardened vegetable fats such as margarine and ghee, and are often present in snack, baked, and fried foods.
- Manufacturers often use them as they have a longer shelf life than other fats.

Stats

- The WHO recommends that every country, including India, eliminate transfat by reducing the allowable level to less than 2% in fats, oils, and all food.
- Cardiovascular disease is the leading cause of deaths globally, accounting for one in every three deaths.
- Artificial trans-fat raises bad cholesterol and lowers good cholesterol and is estimated to kill 540,000 people a year around the world.
- trans fat kills more than 60,000 people a year in India.
- Elimination of trans fats is key to protecting health and saving lives

REPLACE provides six strategic actions to ensure the prompt, complete, and sustained elimination of industrially-produced trans fats from the food supply:

REPLACE, which is an acronym for Review, Promote, Legislate, Assess, Create and Enforce, is the first global **initiative to eliminate a risk factor for cardiovascular disease.**

- **RE**view dietary sources of industrially-produced trans fats and the landscape for required policy change.

- Promote the replacement of industrially-produced trans fats with healthier fats and oils.
- Legislate or enact regulatory actions to eliminate industrially-produced trans fats.
- Assess and monitor trans fats content in the food supply and changes in trans-fat consumption in the population.
- Create awareness of the negative health impact of trans fats among policy makers, producers, suppliers, and the public.
- Enforce compliance of policies and regulations.

International Experience

- In Denmark, the first country to mandate restrictions on industrially-produced trans fats, the trans-fat content of food products declined dramatically and cardiovascular disease deaths declined more quickly
- New York city eliminated industrially-produced trans-fat a decade ago, following Denmark's lead
- Countries such as Canada and Argentina when they controlled transfat have provided technical assistance and funding to national industries to help them replace transfat with healthier oils.

India rejects U.S. request on medical device price caps

Context

- India has told the United States it won't abstain from capping prices for more medical devices, regardless of pressure to rethink its stance after price controls on heart stents and knee implants spoilt the market for some US firms,

Why has it raised the issue?

- India's \$5 billion medical device market has provided rich fishing grounds for U.S.-based companies like Abbott Laboratories and Boston Scientific Corp, but the prospect of price caps being extended to more products sent shivers

- The medical device manufacturers argue that India's price control mechanism hurts innovation, profits and future investment, and the USTR described India's policy as "very troubling"

Actions taken by Govt

- Equating high trade margins on some medical devices with "illegal profiteering", the government last year capped prices of some high-end heart stents - small wire-mesh structures used to treat blocked arteries - at around \$450, compared to \$3,000 charged earlier.
- India's drug pricing authority is also pushing to bring three more devices used while treating heart ailments under the ambit of price controls as they are sometimes more expensive than the stent itself
- National Pharmaceutical Pricing Authority (NPPA) has been pushing for more price controls
- NPPA described the prices charged for these products as "exorbitant", and said companies involved in bringing them to the market were enjoying high trade margins.

Generalized System of Preferences (GSP)

- It is a preferential tariff system **extended by developed countries** (also known as preference giving countries or donor countries) **to developing countries** (also known as preference receiving countries or beneficiary countries).
- It involves reduced MFN Tariffs or duty-free entry of eligible products exported by beneficiary countries to the markets of donor countries
- The USTR is currently reviewing India's eligibility under its Generalized System of Preferences (GSP), a programme that allows duty-free imports of certain goods.
- India was the largest GSP beneficiary at \$5.6 billion, the USTR said in April.

BENEFITS OF GSP

- This tariff preference helps **new exporters to penetrate a market and established exporters to increase their market share and to improve upon the profit margins**, in the donor country.

Issue Area

- Preference for stenting even in cases when it is not the best treatment.
 - With cheaper stents and a fall in procedure costs, **many more patients are opting for angioplasty**. Several studies across the globe have shown that in **patients with multiple blocks in all three vessels, open heart surgery is a better procedure than the use of multiple stents**.
- **Ultimately, lack of indigenous research and development** will make the country dependent on imported stents. But that is not all.
 - As future generation stents come into clinical use, multinational companies may choose not to release their latest products in India because of the country's price control regime
- **Medical tourism also will be hit as it will become apparent that Indian hospitals do not have the latest generation stents**. With time, paradoxically, patients who were the intended benefactors of this price control measure may actually turn out to be losers.

Way forward

- The best long-term solution is to encourage and support Indian stent manufacturers and medical device research so that we do not need to depend on imported stents.
- All aspects involving medical device development (clinical research, animal testing, human trials) must be fast-tracked and should be as transparent as possible. There must be a system to make sure that the latest medical devices, including stents, are priced differently.

Eat less saturated, trans fats to curb heart disease: WHO

Context

- The World Health Organisation (WHO) has recommended that adults and children should consume a maximum of 10% of their daily calorie intake in the form of saturated fat (found in meat and butter) and 1% in trans fats.
- Dietary saturated fatty acids and trans-fatty acids are of particular concern as high levels of intake are correlated with increased risk of CVDs

Saturated fatty acids and Trans-fatty acids

- Saturated fatty acids are found in foods from animal sources such as butter, milk, meat, salmon, and egg yolks, and some plant-derived products such as chocolate and cocoa butter, coconut, palm and palm kernel oils.
- Trans-fatty acids can be industrially produced by the partial hydrogenation of vegetable and fish oils, but they also occur naturally in meat and dairy products from ruminant animals (for example, cattle, sheep, goats and camels).
- Industrially-produced trans-fatty acids can be found in baked and fried foods (doughnuts, cookies, crackers, pies, etc.), pre-packaged snacks and food, and in partially hydrogenated cooking oils and fats that are often used at home, in restaurants, or by the informal sector, such as street vendors of food.

Stats

- They are aimed at controlling non-communicable diseases (NCDs), which are responsible for an estimated 39.5 million deaths (72%) of the 54.7 million deaths worldwide in 2016.

Science and Technology

Insight Mission

- InSight, short for **Interior Exploration using Seismic Investigations, Geodesy and Heat Transport**, is a Mars lander designed to give the Red Planet its first thorough checkup

- It is the first outer space robotic explorer to study in-depth the "inner space" of Mars: its crust, mantle, and core
- Studying Mars' interior structure answers key questions about the early formation of rocky planets in our inner solar system - Mercury, Venus, Earth, and Mars - more than 4 billion years ago, as well as rocky exoplanets. InSight also measures tectonic activity and meteorite impacts on Mars today.
- This mission is part of NASA's Discovery Program for highly focused science missions that ask critical questions in solar system science.
- This is the first launch to another planet from the West Coast.

Study Quakes

- It will use seismology (the study of quakes) to determine the makeup and structure of the Red Planet's core, mantle, and crust.
- Currently, we know that Mars' crust consists of lighter rocks and minerals, while heavier materials sank down to form its core and mantle.
- To learn more about its internal composition, the lander will use specialized instruments to observe seismic waves during "marsquakes."

Instruments

- The key instrument on board is a seismometer, called the **Seismic Experiment for Interior Structure**, made by the French Space Agency.
- After the lander settles on the Martian surface, a robotic arm is supposed to emerge and place the seismometer directly on the ground.
- The second main instrument is a self-hammering probe that will monitor the flow of heat in the planet's subsurface. Called **the Heat Flow and Physical Properties Package**, it was made by the German Space Agency with the participation of the Polish Space Agency.

When NECTAR turned poison for bamboo

New Delhi's renewed bid to turn bamboo into gold is riding a repackaged failure

- Union Finance Minister Arun Jaitley allocated ₹1,290 crore in Budget 2018 for a restructured National Bamboo Mission (NMB).
- ordinance in November 2017 amending the Indian Forest Act to rid bamboo, botanically a grass, of its tree tag for 90 years and exempting it from requiring permits for felling or transportation.

National Mission on Bamboo Application (NMBA)

- The Department of Science and Technology (DST) had in 2004 launched the National Mission on Bamboo Application (NMBA) with an outlay of ₹200 crore.

Issue Area

- In almost a decade since, the NMBA has spent ₹100 crore on **building demo bamboo houses that hardly impacted lives across India's bamboo belts.**
- An amount of ₹40 crore, refundable in instalments, was also provided to entrepreneurs as technology development assistance for partly procuring machinery and equipment. Contrary to its name, the **NMBA neither developed any technology nor facilitated technology transfer for the assisted units.**
- **NMBA also failed to develop market linkages and virtually went off the radar.**
- To add to their misery, the Centre slashed duty on imported bamboo products from 30% to 10%.
 - Unable to compete with cheaper bamboo products – allegedly Chinese routed through Southeast Asian countries – in the domestic market, 99.7% of the 385 bamboo units formed with NMBA's assistance shut shop.

The Centre realized the NMBA was remote-controlling the sector from New Delhi.

- The government first suddenly shut down the Rs 200-crore NMBA in December 2013 without fixing any accountability to its functionaries.

- In 2013, the Union Cabinet approved the **creation of an autonomous society registered and headquartered in Shillong** with a fund allocation of ₹292 crore.

North East Centre for Technology Application and Research (NECTAR)

- NECTAR set up in 2012 as an autonomous society under **Department of Science and Technology** to assist the North-Eastern region of the country is **ensuring applications of appropriate technologies for development in the areas of** biodiversity, watershed management, telemedicine, horticulture, infrastructure planning and development, planning and monitoring, tele-schooling using cutting edge MESHNET solutions, employment generation, etc. through utilization of local products/resources and resulting in associated skill development.
- NECTAR, though, isn't all about bamboo. It covers "local and natural resources" of the region comprising Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.
- **Apart from providing technical expertise to market local products, its mission included women empowerment**

Targets set by NECTAR consist of projects in the following areas:

- Projects that secure safety and security of people
- Projects that contribute to Urban Management and Urban Civic Services (CCTV based surveillance systems/traffic management technology), Radio networks, 3-D terrain models, etc.;
- Projects that enable critical, reliable communication at high bandwidth and employing high speeds
- Tele-medicine and E-education meshnets.
- Projects that enable mapping of scarce and critical natural resources like water, forests, public utilities, etc. using 3-D GIS platform at a very high resolution;

- Wide-ranging training and technology projects in areas of bamboo applications across the entire value chain from bamboo growth, primary processing to modern applications and products;
- Income and livelihood programmes in agriculture, horticulture and agri-processing;
- Training and skills development programmes in rural and backward regions.

Issue Area

- It has constituted NECTAR with practically the same set of people, which instead of extending support to the 70-odd units, has started lodging cases against the bamboo entrepreneurs for being defaulters of the now non-existent NMBA's funds
- One of the tasks entrusted to NECTAR is to provide wide-ranging training and technology projects in areas of bamboo applications across the entire value chain from bamboo growth, primary processing to modern applications and products. But this appears to be only on paper

Problems with a DNA registry

Context

- Despite the spate of violent attacks against women, including rapes, in India, very few of the men implicated have been convicted. The outrage over these attacks has reinforced the belief that India **needs a sex offenders' database or a DNA database of those accused and charged with rape.**

Out in the open Highlights of the sex offenders' registry

- The database will contain biometric records of sex offenders across India

- It would also contain the records of juveniles offenders and paedophiles

- Information on "arrested and chargesheeted" offenders will be available only to law enforcement agencies

- Data for "convicted" offenders will be accessible to the public



Stats

- According to the National Crime Records Bureau, only about a quarter of rape cases ended in conviction in 2016. These rates are low in other countries too.

Issue Area

- DNA identification technologies have advanced so much that **even minor genetic differences, such as those among family members, may be used to distinguish individuals and identify a person** from his or her unique DNA.
- Still, planting of DNA in a crime scene, misinterpretation of tests, and errors in analyses have all taken place in cases where DNA has been used to **implicate a suspect, resulting in the miscarriage of justice.**
- Besides, everybody leaves traces of DNA in numerous places, as cells are shed, leading to ridiculous mistakes
- Protecting **innocent people's privacy and their civil liberties** and rights are the main concerns.
- The police sometimes use **DNA dragnets whereby all the people in a community** are persuaded to give their saliva or blood in order to identify a possible suspect amongst them.
 - These methods are simply **an expansion of the 'stop and search' approach to target particular groups of people on the basis of race,**

ethnicity or class, even though most of their members would be innocent.

- It was reported that in 2007, close to three-quarters of the young black male population in the U.K. were on the DNA database.

Experience from other countries

- Experience with the U.K. and U.S. databanks has shown that having more innocent people's DNA stored **increases the chances of a false positive** and has not increased the chances of finding a guilty match.

What should be done?

- One, it is absolutely essential that the people from whom **DNA is taken give their informed consent**; taking DNA surreptitiously should be prohibited.
- Two, a **court order should be required for obtaining DNA without informed consent** and the DNA should only be compared with the crime scene DNA for the suspect.
- Three, those who are **cleared for a crime should not have their DNA information stored**, and DNA gathered from offenders should be destroyed after identification so that such information is not used for profiling in future.
- Four, a **court order should be necessary to access medical records for genetic data**.