

ENVIRONMENTAL SCIENCE

❖ **Biotransformation technology**

➤ **CONTEXT:** A UK-based startup, based at Imperial College in London, claims to have developed a technology that could alter the state of plastics and make them biodegradable. The company calls the process “biotransformation”. It claims the technology would digest the plastic packaging waste naturally with the help of microbes and biodegrade the waste without leaving behind any microplastics.

- E-commerce giant Amazon generated an estimated 321 million kilograms (709 million pounds) of plastic from packaging waste in 2021 alone. This is a result of billions of boxes it shipped to its customers globally, according to a December 2022 report by Oceana. The ocean advocacy group notes that this is enough plastic to circle the Earth over 800 times as air pillows.

- While Amazon refuted Oceana’s claim, stating that it follows a science-based approach to reduce packaging waste, there is a lot left to be done.

➤ **What is Biotransformation technology?**

- Biotransformation technology is a novel approach to ensure plastics that escape refuse streams are processed efficiently and broken down. The tech was co-developed by the Imperial College in London, UK, and a Britain-based startup, Polymateria.

- Plastics made using this technology are given a pre-programmed time during which the manufactured material looks and feels like conventional plastics without compromising on quality. Once the product expires and is exposed to the external environment, it self-destructs and biotransforms into bioavailable wax. This wax is then consumed by microorganisms, converting waste into water, CO₂, and biomass.

- According to the CEO of Polymateria this biotransformation technology is the world’s first that ensures polyolefins fully biodegrade in an open environment causing no microplastics.

➤ **Why do we need it?**

- According to India’s Environment Ministry the country is generating 3.5 billion kgs of plastic waste annually and that the per capita plastic waste generation has also doubled in the past five years. Of this, a third comes from packaging waste.

- In 2019, plastic packaging waste from e-commerce firms was estimated at over a billion kilograms worldwide, according to Statista.

- A joint research project by Department of Management Studies, IIT Delhi, and Sea Movement noted that Amazon generated, nearly 210 million kgs (465 million pounds) of plastic from packaging waste in 2019. They also estimated that up to 10 million kgs (22.44 million pounds) of Amazon’s plastic packaging ended up in the world’s freshwater and marine ecosystems as pollution in the same year.

- However, Amazon India has now eliminated the single-use plastics across its fulfilment centers. Flipkart has also done the same in 2021 across its supply chain.

➤ **Where can this technology be used?**

- Food packaging and health care industries are the two prime sectors that could use this technology to reduce waste. The increase in cost is relatively small compared to conventional plastic that does not contain” this technology.

➤ **Is this being used in India?**

- Some well-known Indian firms in food and packaging industries deploy such technologies. Within healthcare and pharma industries, this technology provides biodegradable solutions for non-woven hygiene products like diapers, sanitary napkins, facial pads, etc.

➤ **Are we heading in the right direction?**

- The Indian government has launched multiple initiatives to move the country towards sustainability. They introduced a plastic waste management gazette to help tackle the ever-growing plastic pollution caused by single-use plastics.

- In 2022, the Indian government imposed a ban on single-use plastics to bring a stop to its use in the country.

- The National Dashboard on Elimination of Single Use Plastic and Plastic Waste Management brings all stakeholders together to track the progress made in eliminating single-use plastic and effectively managing such waste.

- An Extended Producer Responsibility (EPR) portal helps in improving accountability traceability, and facilitating ease of compliance reporting in relation to EPR obligations of the producers, importers and brand-owners.

- India has also developed a mobile app (CPCB Grievance Redressal App) to report single use plastics grievances to check sale, usage or manufacturing of single use plastics in their area.

➤ **What are the alternatives to reducing plastic waste?**

- A switch to jute or paper-based packaging could potentially cut down plastic waste. This could also build sustainability within the paper industry, and save on the import bill on ethylene solutions. The wooden packaging is yet another alternative, but that will make the packaging bulkier and increase cost.

- The Government of Tamil Nadu, in Chennai, organised National Expo and Conference of Startups to raise awareness on alternatives to single-use plastics. The alternatives showcased were made using coir, bagasse, rice and wheat bran, plant and agricultural residue, banana and areca leaves, jute and cloth.

PRELIMS

1. PM-YASASVI Scheme

➤ **CONTEXT:** According to government data presented to the Parliamentary Standing Committee on Social Justice and Empowerment, the Ministry of Social Justice and Empowerment was only able to spend 1% of the money allocated for a pre-matric scholarship programme for students of Scheduled Castes and other groups, and less than half of the money allocated for a post-matric scholarship programme for SC students.

- The House panel noted that, as of December 31, 2022, just a little over 2% of the more than 1,500 crore allocation had been spent for the PM-YASASVI scheme, which offers pre- and post-matric scholarship benefits to Other Backward Classes, Extremely Backward Classes, and Denotified Tribes.
- The committee also noticed that, of the authorised Rs 5,660 crore through December 31, 2022, the government has only been able to spend 2,500.22 crores on the post-matric scholarship for SC students. In the same time frame, just 56 lakhs of the 500 crores allocated were spent on the pre-matric scholarship programme for SC children and others.
- The panel highlighted that the low expenditure in the SC student programmes was a result of delays brought on by a new disbursement system for Centrally-sponsored programmes that demand State payments. Even though the Union government fully supports the PM-YASASVI initiative, it likewise saw low use.

➤ **About the Scheme**

- Ministry of Social Justice and Empowerment offer scholarships to meritorious students under the PM YASASVI scheme.
- This programme is open to deserving students from classes 9 through 12 who belong to the underprivileged group.
- To be eligible for the PM YASASVI programme, a student must fall under one of the following categories: Other Backward Class (OBC), De-Notified, Nomadic and Semi-Nomadic (DNT), or Economically Backward Class (EBC). The candidate's guardians' or parents' income must be less than Rs 2.5 Lakh per year for them to qualify for this scholarship.
- The Class 9 and Class 10 students will receive Rs. 75,000 annually under this programme, and the Class 11 and Class 12 students will receive Rs. 1, 25,000 annually.
- Students will be chosen for the scholarship based on their performance on the National Testing Agency's YASASVI Entrance Exam. The entrance exam is held in the computer-based test (CBT) mode.

2. Vedic Heritage portal

➤ **CONTEXT:** Inaugurating the 'Vedic Heritage Portal' created by the Indira Gandhi National Centre for the Arts (IGNCA) in New Delhi, Union Minister for Home Affairs said that with the help of this, the younger generation would be able to carry forward the knowledge and tradition of the Vedas and the Upanishads.

- He also inaugurated a virtual museum — 'Kala Vaibhav' — built by the Indira Gandhi National Centre for the Arts (IGNCA).

➤ **About**

- Vedic heritage portal and a virtual museum -- 'Kala Vaibhav' -- built by the Indira Gandhi National Centre for the Arts (IGNCA).
- The portal aims to communicate messages enshrined in the Vedas. It will help common people to have a general understanding about the Vedas.
- The portal will be a one-stop solution for the user, who would like to search any information regarding the Vedic heritage.
- The audio visual recording of four vedas have been uploaded on the Vedic Heritage portal. The portal has over 18 thousand mantras of the four vedas with a duration of over 550 hours.

➤ **Indira Gandhi National Centre for the Arts (IGNCA)**

- Indira Gandhi National Centre for the Arts(IGNCA) was established in 1987 as an autonomous institution under the Ministry of Culture, as a centre for research, academic pursuit, and dissemination in the field of the arts.
- IGNCA has a trust (i.e. Board of Trustees), which meets regularly to give general direction about the Centre's work.
- The Executive Committee, drawn from among the Trustees, functions under a Chairman.
- Project 'Mausam' is a Ministry of Culture project to be implemented by Indira Gandhi National Centre for the Arts (IGNCA), New Delhi as the nodal coordinating agency with support of Archeological Survey of India and National Museum as associate bodies.

3. Arth Ganga Project

➤ **CONTEXT:** Arth Ganga is a sustainable viable economic model conceptualized under "Namami-Gange" program to integrate people in the basin with Ganga Rejuvenation.

➤ **What is Arth Ganga?**

- It focuses on developing chances for economic livelihood to support the activities under Namami Gange Programme. Namami Gange Programme is the government's major initiative to clean up the Ganga and its tributaries.
- **The government is focusing on six pillars under Arth Ganga.**
- Zero Budget Natural Farming, which encourages the use of cow dung as fertilizer through the Gobardhan initiative and chemical-free farming for 10 km on either side of the river.
- Monetization and Reuse of Sludge and Wastewater, intends to reuse treated water in agriculture, commerce, and the generation of cash for Urban Local Bodies (ULBs).
- By creating haats where locals may sell commodities, medications, and Ayurveda, Arth Ganga would also create opportunities for people to generate income.
- To improve popular engagement by strengthening the relationships between the many river stakeholders.
- To boost the cultural identity and tourism of Ganga and its surroundings via boat tourism, adventure activities, and yoga programs.
- To aid in infrastructure reforms by bolstering local authorities for improved water governance.
- **What are the additional projects launched under it?**
- Jalaj: It was introduced in 26 locations on the main stem states of the Ganga basin and entails establishing a small business or floating mobile centre to encourage livelihood on the banks of the River Ganga.
- Sahakar Ganga Grams: An agreement between NMCG and Sahakar Bharti aims to designate 75 villages in five states as "Sahakar Ganga Grams," to encourage natural farming and make it easier to market natural farming/organic produce under the Ganga brand.
- ImAvatar: A tourism-related webpage, aims to improve livelihood prospects throughout the Ganga basin by facilitating travel, marketing regional goods and preserving ghats and other assets built by NMCG.
- 4. New Development bank**
- **CONTEXT: Former Brazilian President Dilma Rousseff has been unanimously elected as the head of New Development Bank (NDB).**
- **About:**
- It is a multilateral development bank operated by the BRICS states (Brazil, Russia, India, China and South Africa).
- HQ: Shanghai, China
- Establishment: Agreed by BRICS leaders at the 5th BRICS summit held in Durban, South Africa in 2013. It was established in 2014, at the 6th BRICS Summit at Fortaleza, Brazil.
- **New members:** The Bank's membership is open to members of the UN. Bangladesh & UAE joined as new members in 2021. Other members like Egypt & Uruguay are the prospective members.
- ✓ Prospective members listed herein have been admitted by NDB's Board of Governors and will officially become a member country once they deposit their instrument of accession.
- **Aim & Objectives:** Foster greater financial and development cooperation. Mobilise resources for infrastructure and sustainable development projects in BRICS & other emerging economies.
- **Voting method:** The initial subscribed capital (USD 100 billion) was equally distributed amongst the founding members.
- ✓ The number of shares to be initially subscribed by other members shall be determined by the Board of Governors by the special majority on the occasion of the acceptance of their accession.
- ✓ None of the countries has the veto power.
- In 2018, the NDB received observer status in the United Nations General Assembly.
- **How is NDB different from AIIB?**
- AIIB has 57 countries predominantly in the Asia and Pacific region whereas NDB has five BRICS countries.
- Decision making in the NDB is more democratic, each member has one vote and decisions are taken by a simple voting method.
- Whereas voting shares in AIIB are based on the size of each member country's economy (GDP in PPP terms) and not on the basis of a contribution to the bank's authorised capital. China, India and Russia are the three largest shareholders.
- In AIIB, China is the largest shareholder with 26.61 % voting shares in the bank followed by India (7.6%), Russia (6.01%) and Germany (4.2 %).
- 5. Parvatmala Project**
- **CONTEXT: The detailed feasibility studies completed for 8 projects for implementation of Ropeways under Parvatmala program.**
- The National Ropeway Development Programme is also known as 'Parvatmala' (Parvatmala means garlanding mountains).
- The project aims to decongest mountainous areas where road and train connectivity cannot be upgraded beyond a limit.
- 30 priority points or stretches will be constructed under phase-I of the project.

- The Parvatmala project was announced in the 2022-23 Union Budget.
- Parvatmala will construct ropeways in mountainous terrains of India under the Public Private Partnership (PPP).
- Nodal Ministry - The Ministry of Road Transport and Highways undertakes the project.
- The ministry will oversee all the affairs related to the ropeway construction, research, and policy-making.
- Implementing Agency - The National Highways Logistics Management Limited (NHLML) has been mandated by the ministry to implement the project.
- NHLML is a 100% owned SPV of National Highways Authority of India (NHAI). NHLML has aimed to complete construction of 8 ropeways in FY 2022-2023.
- Advantages of Ropeways
 - ✓ Economical mode of transportation
 - ✓ Faster mode of transportation
 - ✓ Environmentally friendly
 - ✓ Last mile connectivity
 - ✓ Ability to handle large slopes
 - ✓ Ideal for hilly and difficult terrain
 - ✓ Low footprint - Low land use

ANSWER WRITTING

Q. Developed countries owe historic responsibility for climate change. In the light of this statement, discuss the concept of climate reparation & climate justice highlighting the recent developments.

Climate justice is a concept that addresses the just division, fair sharing, and equitable distribution of the benefits and burdens arising out of climate change. UNFCCC also acknowledged & embraced the principle of climate justice. For example, the rich nations would reduce emissions while the developing countries would receive help in the form of financing & clean technology.

The principle of Common but Differentiated Responsibilities (CBDR) of United Nations Framework Convention on Climate Change (UNFCCC) acknowledges the differing responsibilities of individual countries in addressing climate change, as historically, the developed countries have been the prime polluters.

For example, the U.S. released around 500 gigatons of CO₂ since 1850, representing some 20% of the global total & these historical emissions did not include overseas emissions under colonial rule.

Though the calls for “climate reparations” & “climate justice” are not new, climate activists at COP-26 have given much needed push to these calls.

The concept of climate justice is intrinsically linked with that of climate reparations. Climate reparations calls for finances to be provided by the Global North to the Global South as a means to address the historical responsibility of the Global North towards climate change.

However, these calls have suffered from following shortcomings:

- In 2009, at COP-15, developed countries pledged \$ 100 bn / year in climate financing, however, they’ve barely lived up to the pledge.
- Also, the demand for loss & damage (impact of climate change that can’t be adapted) compensation has been heavily resisted in the climate talks. Rich nations have consistently refused to accept the liability or calls for fair compensation.
- At COP-26, the establishment of a new fund for loss & damage was rejected in the final agreement of Glasgow Climate Pact.
- On its signature loss and damage commitment, COP 27 remains unclear how the loss and damage fund will be financed.

However, these calls have been met with the following changes:

- Irresponsibility: Developed countries have been showing resistance to the call for climate justice. For example, the Canadian parliament refused the proposal for increased investment in climate change actions.
- Lobbying by Industrialists: Big industrialists, particularly, in the developed world, pressurize governments not to take decisions for quick transition to renewable based solutions as it would hamper their profit margins.
- Lack of Will & Funds: Developed countries lack both will and the desire to contribute funds for implementing climate change actions.
- Lack of Implementation of Climate Pacts: Article 6 of Paris Deal that calls for establishment of International Carbon Markets has not been implemented in both letter & spirit.

The concept of climate justice & climate reparations makes the issue of climate change an ethical & political one, rather than one that is purely environmental in nature. Both these concepts focus on humanizing the impact of climate change. Therefore, there is a need for civil society groups & climate activists to push governments to take the path of sustainable development & implement climate change actions on top priority.

MCQs

1. Consider the following statements:
 1. New Development Bank has been set up by Asia Pacific Economic Cooperation.
 2. The headquarters of New Development Bank is in Shanghai.
 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

2. Consider the following statement with reference to Arth Ganga project
1. Arth Ganga focuses on the sustainable development of the Ganga and its surrounding areas, by focusing on economic activities related to the river.
 2. Under Arth Ganga, the government is working on six verticals which include Zero Budget Natural Farming on 10 km on either side of the river and the promotion of cow dung as fertiliser through the GOBARdhan scheme.
- 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 of the following is/are the beneficiary of PM YASASVI programme?
1. Other Backward class (OBCs) students.
 2. Economically Backward class (EBCs) students.
 3. De-notified, Nomadic and Semi-Nomadic Tribes (DNT/S_NT) Students
- Choose the correct answer using the codes given below
- a) 1 and 2 only b) 2 only c) 3 only **d) 1,2 and 3**
4. Consider the following statements regarding the 'Vedic Heritage Portal' recently in news
1. The portal will be a one-stop solution for the user, who would like to search any information regarding the Vedic heritage.
 2. It has been created by the union Ministry of Education.
- Which of the above statements is/are correct?
- a) 1 only** b) 2 only c) Both 1 and 2 d) Neither 1 nor 2
5. Consider the following statements about Parvatmala program:
1. It aims to develop ropeways in hilly areas of the country.
 2. The Ministry of Road Transport and Highways (MORTH) is the Nodal Ministry for the scheme.
- Which of statements given above is/are correct?
- a) 1 only b) 2 only **c) Both 1 and 2** d) Neither 1 nor 2
6. With reference to India, consider the following statements:
1. When a prisoner makes out a sufficient case, parole cannot be denied to such prisoner because it becomes a matter of his/her right.
 2. State Governments have their own Prisoners Release on Parole Rules.
- 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
7. Vembanad and astamudi lake often mentioned in news are situated in which of the following state?
- a) Karnataka b) Maharashtra c) Gujarat **d) Kerala**
8. The "Polluter Pays Principle" was first introduced by which of the following organisation?
- a) OECD** b) UNEP c) World Bank d) UNDP
9. Consider the following statements:
In India, taxes on transactions in Stock Exchanges and Futures Markets are
1. Levied by the Union
 2. Collected by the States
- 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. With reference to Project Himashakti consider the following
1. Under the project the Ministry of Defence has signed a contract with Bharat Electronics Limited (BEL) for the procurement of two HimShakti Integrated Electronic Warfare (EW) Systems.
 2. The Himshakti EW system is designed for operations in mountainous terrain, with a specific focus on countering Chinese military threats.
 3. The EW system is designed and developed by Defence ISRO in collaboration with its manufacturing partner BEL.
- Which of the above statement/s is/are not correct?
- a) 1 and 2 only b) 2 only c) 2 and 3 only **d) 3 only**
11. 6x6x6 strategy often mentioned in news is related to which of the following?
- a) Anaemia** b) TB c) AIDS d) Undernourishment
12. Consider the following statements about the "LaQshya", an initiative by the government:
1. It is a Safe Delivery Mobile Application for health workers who manage normal and complicated deliveries.
 2. It is aimed at improving quality of maternity care in labour room and maternity Operation Theatre (OT).
- Which of the above statements is/are correct?
- a) 1 only b) 2 only **c) Both 1 and 2** d) Neither 1 nor 2