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DBT-BIRAC Clean Tech Demo Park

- Union Science & Technology Ministry has inaugurated the "DBT-BIRAC Clean Tech Demo Park" at New Delhi.
- The DBT-BIRAC Clean Tech Demo Park will be used to demonstrate innovative Waste-to-Value technologies.
- It is supported by Department of Biotechnology (DBT) and Biotechnology Industry Research Assistance Council (BIRAC).
- This park will be managed by the Clean Energy International Incubation Centre (CEIIC), a public-private-partnership incubator set up jointly by DBT, BIRAC and Tata Power.
- DBT has undertaken several initiatives under Swachh Bharat Mission for the development, demonstration and promotion of innovative clean waste-to-value technologies such as

1. Biomethanation,
2. Constructed wetlands,
3. Algal treatment
4. Water membrane filtration.

Delhi-Meerut RRTS Project

- New Development Bank, also known as BRICS Bank has approved infrastructure projects worth 741 million dollars in India.
- The funds will be used for the following projects
- **Delhi-Meerut Regional Rapid Transit System (RRTS) Project** – the Loan would be used by Government of India for on-lending to the National Capital Region Transport Corporation Limited (NCRTC).

- The RRTS will have a total length of 82.15 km (68.03 km elevated and 14.12 km underground) with 25 stations.

- It will have a design speed of 180 km per hour, maximum operating speed of 160 km per hour and high-frequency operations.

- It aims to reduce journey time from Delhi to Meerut to 60 minutes.

- **Mumbai Metro Rail II (Line 6) Project -** The loan will be used by the Government of India for on-lending to the Government of the State of Maharashtra for implementing a metro rail Line 6 with length of about 14.47 km in the city of Mumbai.
- The Project will be implemented by the Mumbai Metropolitan Region Development Authority.

New Development Bank

- NDB is a multilateral development bank jointly founded by the BRICS countries (Brazil, Russia, India, China and South Africa) at the 6th BRICS Summit in Fortaleza, Brazil in 2014.
- It was formed to support infrastructure and sustainable development efforts in BRICS and other underserved, emerging economies for faster development through innovation and cutting-edge technology.
- It is headquartered at Shanghai, China.
- In 2018, the NDB received observer status in the United Nations General Assembly, establishing a firm basis for active and fruitful cooperation with the UN.
- According to the NDB's General Strategy, sustainable infrastructure development is at the core of the Bank's operational strategy for 2017-2021.

Pusa Decomposer

- 'Pusa Decomposer' is essentially a fungi-based liquid solution that can soften hard stubble to the extent that it can be easily mixed with soil in the field to act as compost.
- This would then rule out the need to burn the stubble, and also help in retaining the essential microbes and nutrients in soil that are otherwise damaged when the residue is burned.
- Pusa Decomposer was developed by Indian Agriculture Research Institute (IARI).
- There are seven strains of fungi that IARI has identified after research which help in rapid breakdown of hard stubble.
- These seven strains of fungi are packed into four capsules known as PUSA Decomposer Capsule.
- Recently Union Environment Ministry has said that the Pusa Decomposer will be used on a trial basis this year in Punjab, Haryana, Uttar Pradesh and Delhi to curb stubble burning.

Delhi's Air Quality Index

- Air quality in the national capital turned ‘poor’ for the first time this season October 7, 2020, according to Central Pollution Control Board (CPCB).
- The Air Quality Index (AQI) in Delhi was 215 October 7, according to CPCB, It is expected to deteriorate further.
- The reasons for deteriorating air quality are as follows

1. Dip in temperature,
2. Calm surface winds,
3. Steady increase in farm fires in Punjab and Haryana.

Characteristics of AQI

- Classification of an AQI between 0-500 are as follows

1. 0-50 is considered ‘good’
2. 51-100 ‘satisfactory’
3. 101-200 ‘moderate’.
4. 201-300 ‘poor’.
5. 301-400 ‘very poor’.
6. 401-500 ‘severe’.

- An AQI above 500 falls in ‘severe-plus or emergency’ category.

Sea Surface Temperature

- Sea surface temperature (SST) is the water temperature close to the ocean's surface.
- The exact meaning of surface varies according to the measurement method used, but it is between 1 millimetre (0.04 in) and 20 metres (70 ft) below the sea surface.
- Air masses in the Earth's atmosphere are highly modified by sea surface temperatures within a short distance of the shore.
- SST changes diurnally, like the air above it, but to a lesser degree, there is less SST variation on breezy days than on calm days.
- A new study on variability in the Mascarene High (MH) during global warming hiatus (GWH) revealed that the Southern Indian Ocean has experienced significantly increased sea surface temperature (SST) during this period (1998-2016).
- **The Mascarene High (MH)** is a semi-permanent subtropical high-pressure zone in the South Indian Ocean.
- Apart from its large influence on African and Australian weather patterns, it also helps in driving the inter-hemispheric circulation between the

Indian Ocean in the south and subcontinental landmass in the north.

- **A global warming hiatus** is referred to a global warming pause, or a global warming slowdown, which is a period of relatively little change in globally averaged surface temperatures.
- The hiatus, however, can result in an increase in the SST.
- This warming in SST, resulted in a decrease in the pressure gradient between the MH and the Indian landmass.
- This in turn suppressed the intensity of low-level cross-equatorial winds over the western Indian Ocean affecting the onset of the monsoon over the Indian subcontinent and rainfall over East Asia.
- The southwest monsoon caused by this high pressure area is the strongest component of the Indian subcontinent monsoon that contributes about more than 80 per cent of the annual rainfall in entire East Asia.
- The weakening of the MH in the southern Indian Ocean during GWH may affect the strength of the upwelling along the coast of Somalia and Oman and thus, influence the Arabian Sea ecosystem.

Super Habitable Planets

- Recently researchers have found out that there are at least 24 super habitable planets which may support life better than the Earth.
- For this finding, researchers have rummaged for the planets which are older, slightly warmer and wetter than the Earth.
- Moreover, all these planets are 100 light-years away from the Earth located outside the Solar System.
- Favorable factors in planets for hosting life
- **Age and Star the planet Orbits -** The scope of life on any planet significantly depends upon the star it orbits.
- Earth which is 4.5 billion years old, orbits around the Sun that has relatively shorter lifespan of less than 10 billion years while complex life appeared on the Earth only after 4 billion years.
- The research also suggests that there may be the origin of better life on those planets which are 5 to 8 billion years old and are revolving changing stars with longer lifespan than the Sun at a lower speed.
- **Types of Stars -** Scientists further classified these stars into G-stars which have lifespan less than that of 10 billion years and K-stars that are comparatively cooler, dwarf stars with lifespan of 20 to 70 billion years.
- As a consequence, appearance of complex life may not take place in conducive manner on those planets which are revolving around a G-star as their star may run out of fuel before any substantial form of complex life develops on them.

- On the contrary, those planets orbiting K-stars may have favorable outcomes pertaining to the appearance of intricate life processes due to longer lifespan of its star.
- **Mass of the Planet –** It is one of the promising factors to determine evidence regarding life-formation.
- The research concluded that the planet which is 10 percent larger than the Earth will be having greater area of habitable land with larger mass and would be able to easily retain its interior heating through radioactive decay.
- **Surface temperature of planets –** this play a crucial role in indicating any life-supporting evidences as it would decide the formation of water, moisture and clouds.
- Planets having comparatively 5 degree-Celsius higher temperature than the Earth might be suitable for better conditions of life as overall higher temperature with greater moisture can lead to emanation of diverse forms of life as it is also corroborated by Earth's biodiversity.
- Researchers have further claimed that out of 24 super habitable planets, only one planet has depicted various life-supporting evidences while Scientist Dirk Schulze-Makuch affirmed that such a discovery would help in accentuating future observation through, LUVIOR Space telescope and PLATO space telescope.

Telescopes used for finding earth like planets

- **James Web Telescope –** It is sometimes called JWST or Web, it is an orbiting infrared observatory that will complement and extend the discoveries of the Hubble Space Telescope, with longer wavelength coverage and greatly improved sensitivity.
- The longer wavelengths enable Webb to look much closer to the beginning of time and to hunt for the unobserved formation of the first galaxies, as well as to look inside dust clouds where stars and planetary systems are forming today.
- It will be the largest, most powerful and complex space telescope ever built and launched into space.
- **Large Ultraviolet Optical Infrared Surveyor, commonly known as LUVOIR** – It is a multi-wavelength space telescope concept being developed by NASA under the leadership of a Science and Technology Definition Team.
- It has the key science goal of characterizing a wide range of exoplanets, including those that might be habitable.
- LUVOIR can observe ultraviolet, visible, and near-infrared wavelengths of

light.

- **PLAnetary Transits and Oscillations of stars (PLATO)** is a space telescope under development by the European Space Agency for launch in 2026.
- The mission goals are

1. To search for planetary transits across up to one million stars,
2. To discover and characterize rocky extrasolar planets around yellow dwarf stars (like our sun), subgiant stars, and red dwarf stars.

- The emphasis of the mission is on earth-like planets in the habitable zone around sun-like stars where water can exist in liquid state.

Source: DtE, Indian Express, PIB, AIR NEWS

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