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This issue :

Trending

- **Maharashtra and Uttar Pradesh are two states to recently ban the use of plastic.**
- **India ranks 177 out of 180 in the Environmental Performance Index (EPI), mainly due to poor environmental health policy and deaths due to air pollution.**

‘TREE GLUE’ TO BE USED AS PLASTIC

Plastic packaging has become a serious environmental threat, and there are serious initiatives taken by several countries across the globe to ban plastic bags, resulting in food producers seeking alternative solutions. More than 100 kg of plastic waste is generated per person in the world and this is rising at an alarming rate. In 2017 alone, 166.3 kg of packaging waste was generated per inhabitant in Europe, varying from 51.2 kg per citizen in Croatia to 222.2 kg in Germany. Although some of this waste is recycled, much of it stays in landfills taking decades to biodegrade. In fact, only 40.9% of packaging was recycled.

The researchers from University of Warwick led by professor of Biological Chemistry Tim Bugg have stumbled upon a natural tree glue called lignin. This glue is flexible enough to be moulded into containers, strong enough to be sturdy and, best of all, completely biodegradable. Lignin gets its unique qualities from its consistency to hold cellulose fibres together in order to stiffen plant stems. The tree glue is an unwanted by-product of the papermaking industry, carefully removed during processing because its properties weaken and discolour paper made of wood pulp.

Now Bugg and his team have developed a method for genetically modifying lignin feeding bacteria called ***Rhodococcus Jostii*** into a specimen that can turn the glue into large amounts of biodegradable plastic. The modified bacteria may prove to be a key in a process once considered impossible.

The team’s re-engineering efforts also saw them combine the genetic material from two strains of bacteria to increase the speed at which the tree glue was transformed into plastic. The bacteria uses it for growth and breaks it down into small molecules which it uses as food to grow.

The team now hopes to be successful in their unique endeavour within the next five years. If recent developments in bacterial engineering are used as reference, the team may well achieve this in its ambitious timeframe. Well, in coming days when the planet will think for an non– polluting alternative for plastic, tree glue will be the best replacement.

SOURCE: **telegraph.co.uk**

COAL WASTE TO SUSTAINABLE CONCRETE

Washington State University researchers have created a sustainable alternative to traditional concrete using coal fly ash, a waste product of coal-based electricity generation process. The advance tackles two major environmental problems at once by making use of coal production waste and by significantly reducing the environmental impact of concrete production. Production of traditional concrete, contributes between 5-8% of greenhouse gas emissions worldwide. That's because cement, the key ingredient in concrete, requires high temperatures and a tremendous amount of energy to produce.

Fly ash, the material that remains after coal dust is burned, has become a significant waste management issue in the world. More than 50% of fly ash ends up in landfills, where it can easily leach into the nearby environment. While some researchers have used fly ash in concrete, they haven't been able to eliminate the intense heating methods that are traditionally needed to make a strong material and thus this production does not require heating or any use of the cement.

The team used graphene oxide, a nanomaterial, to manipulate the reaction of fly ash with water and turn the activated fly ash into a strong cement-like material. The graphene oxide rearranges atoms and molecules in a solution of fly ash and chemical activators like sodium silicate and calcium oxide.

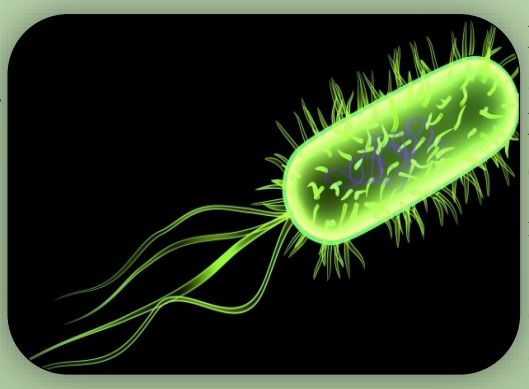
The process creates a calcium-aluminate-silicate-hydrate molecule chain with strongly bonded atoms that form an inorganic polymer network more durable than (hydrated) cement. Additionally, water can pass through it to replenish groundwater and to mitigate flooding. So, the coal waste which used to create environmental problems can now be used effectively.

SOURCE : SCIENCEDAILY

E.COLI BACTERIA TO POWER SOLAR CELLS

In a study published recently, a new biogenic approach invented by researchers of the University of British Columbia produced and have re-engineered the **E.coli bacteria** (named after the famous scientist Escherich) to power solar cells. Such cells generated strong currents and were capable of working even under dim light environmental conditions. An impressive current density of 0.686 mA per sq cm was recorded, significantly higher than the 0.362 achieved earlier in the field. These improved cells are also ideal in conditions such as overcast skies.

Solar cells, the building blocks of solar panels, are responsible for converting light into electrical current. It revolves around extraction



of natural dye that bacteria use for photosynthesis, an expensive inconvenient process that includes the dangerous use of toxic components. Researchers genetically engineered the E. coli to produce unusually large amounts of lycopene, a powerful photoactive pigment. They then coated the new bacteria with a mineral consisting of TiO_2 nanoparticles that acted as a semiconductor and further applied the resulting mixture to a glass surface in order to increase its photovoltaic (PV) response.

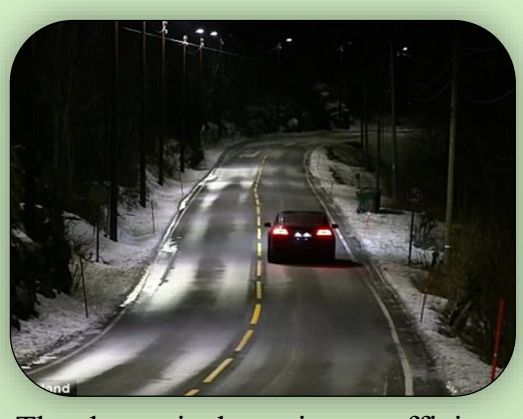
These hybrid materials can be manufactured economically and sustainably, and, with sufficient optimization, could perform at comparable efficiencies as conventional solar cells. In countries like India, where solar energy is very abundant and is a major source of energy, this discovery will greatly benefit the people and the government. The process may reduce the cost of bacterial dye production by up to one-tenth . In this race going on among materials to rule the solar cell world, clean energy is surely the winner.

SOURCE: irishnews.com

AUTO DIMMING STREET LAMPS

Norway is looking to save energy by using state-of-the-art technology to automatically dim street lights when they are not in use. Street lamps get brighter only as traffic approaches and then return to 20 per cent power.

A Norwegian technology called ***Comlight*** is behind the installation. The high-tech lights and sensors could bring significant energy and cost savings, particularly on low-traffic roads. The five-mile stretch of energy-saving street lights saves 2,100 kWH per week . Using LED lights helps reduce CO2 emissions compared to other types of lights. As much as 70-80 per cent of energy can be saved. Due to such big savings, the investment will be repaid in around 4.5 years, with a life of the installed equipment in the range of 15-20 years.



The theoretical maximum efficiency is 80 per cent, given the reduction of light to just one-fifth of normal. The practical efficiency is therefore lower than this depending on how much the lights are switched on for traffic of all types.

Technological advances and energy-savings have been found in the decade since then too, including the use of energy-saving LED lights which are extensively used.

The American Medical Association issued a policy statement in 2016 regarding the switch to LED streetlights and how it may affect human health, and one noted proviso for reducing harm is to dim the lights as much as possible. This technology is more than capable of doing that.

Energy consumption has reduced dramatically since 'intelligent lighting' systems were installed in the late 2000s.The country is moving to work toward environmentally friendly projects in other areas as well. This can be a great initiative for countries to take up with huge energy requirements as it has all potential to save a lot of energy.

SOURCE: www.dailymail.co.uk

SOIL BUGS MUNCH ON PLASTIC

Our world is drowning in a flood of plastic. 8 million tons of plastic end up in the oceans every year. Agricultural soils are also threatened by plastic pollution as farmers around the world apply enormous amounts of **polyethylene (PE)** mulch films onto soils to combat weeds, increase soil temperature and keep the soil moist, thereby increasing overall crop yields. After harvest, it often is impossible for farmers to recollect the entire films, particularly when films are only a few micrometres thin. Film debris then makes its way into the soil and accumulates in the soil over time, because PE is non biodegradable and decreases soil fertility, interfere with water transport and diminishes crop growth.

Researchers at ETH Zurich and the Swiss Federal Institute of Aquatic Science and Technology have

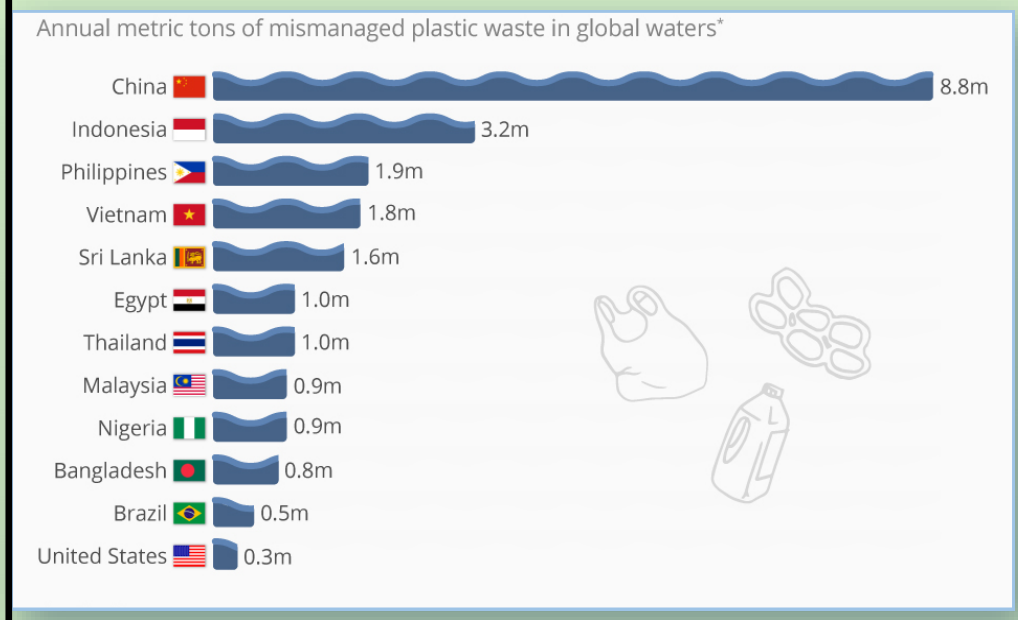
shown that soil microbes degrade films composed of the alternative polymer named **polybutylene adipate co terephthalate (PBAT)**. Their work has just been published in the journal *Science Advances*. Soil microorganisms mineralise PBAT films in soils **composed of alternative polymer** and transfer carbon from the polymer into their biomass. Researchers used PBAT material that was custom-synthesised from monomers to contain a defined amount of the stable carbon-13 isotope.

Upon biodegrading PBAT, the soil microorganisms liberated carbon-13 isotope from the polymer. Carbon-13 from PBAT was not only converted into carbon dioxide (CO_2) as a result of microbial respiration but also incorporated into the biomass of microorganisms colonizing the polymer surface. Thus, reducing the problem of plastic in agricultural soil to a great extent. Many countries are already choking due to plastic and soil bugs can be a huge benefit.

An additional option to reduce the volume of plastic entering agricultural soils is to employ thicker mulch films, which can be recollected after use and then either reused or disposed of via waste incineration. So, solution for large plastic problem is already on the cards.

SOURCE: ETH ZURICH

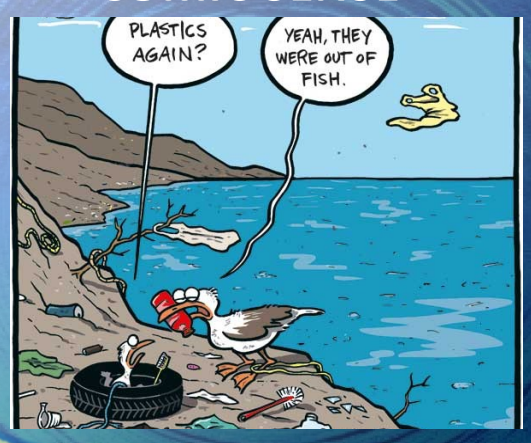
TRASHING THE WORLD'S OCEANS



The data from **STATISTICA** indicates the alarming situation of plastic pollution in our world's oceans. From the graph, China tops the list by trashing nearly 8.8 million metric tons of plastic in the seas and oceans. This is nearly 2.5 times that of Indonesia, which is second on the list.

India is not far behind, but is positioned **12th** in the list having thrown nearly 0.27 million metric tons of plastic waste in the water bodies.

COMIC SENSE



SEEQ 2018

Energy Club, MNIT Jaipur will organize its annual quizzing event "Sustainable Energy and Environment Quiz this month on 18th and 19th August, 2018. Last year, the club witnessed a huge participation from Bachelor to Doctorate level students from different colleges of Rajasthan and the event was a highly successful one.

QUIZ

1. **On which date was Earth Hour 2018 observed?**
2. **Which Southern railway station has earned the unique distinction of being the first energy efficient A1 category station in India?**
3. **Where in India is the first floating solar power plant located?**

CREDITS

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