

## Researchers develop method that makes plastics more degradable under UV light (GS Paper 3, Science and Tech)

### Why in news?

- Researchers in the UK have developed a novel method to **break down plastics using just ultraviolet (UV) light**.

### Details:

- Researchers at the University of Bath discovered that **adding sugar units to polymers increases their degradability** when exposed to UV radiation.
- UV radiation has a wavelength of 10 nanometres (nm) to 400 nm, shorter than that of visible light, but longer than X-rays.
- Many plastics that bear the biodegradable label can only be composted in industrial settings.



### Drawback of PLA usage:

- The public concern about plastic waste has led to the widespread usage of **PLA (Poly lactic acid)**, which a renewable, sustainable alternative to polymers is made from crude oil.
- PLA is used in everything from throwaway cups and teabags to three dimensional (3D) printing and packaging.
- Although PLA is sometimes advertised as biodegradable, it **only dissolves under industrial composting conditions of high temperatures and humidity**, which are not possible in residential compost heaps.
- It is also not easily degradable in natural environments, such as soil or the ocean.

### Findings of the research:

- The research, demonstrated a method that could increase the rate at which these polymers degrade in the environment.
- They found that by adding various quantities of sugar molecules to the polymer, they could modify how quickly the plastic degrades.
- They discovered that incorporating as little as 3% of sugar polymer units into PLA caused it to **degrade by 40% in only six hours** when exposed to UV light.

### Breaking down the plastic:

- The method weakens the plastic, breaking it down into smaller polymer chains that are then more sensitive to hydrolysis.
- This could make the plastic much more biodegradable in the natural environment, for example in the ocean or in a garden compost heap.

#### Way Forward:

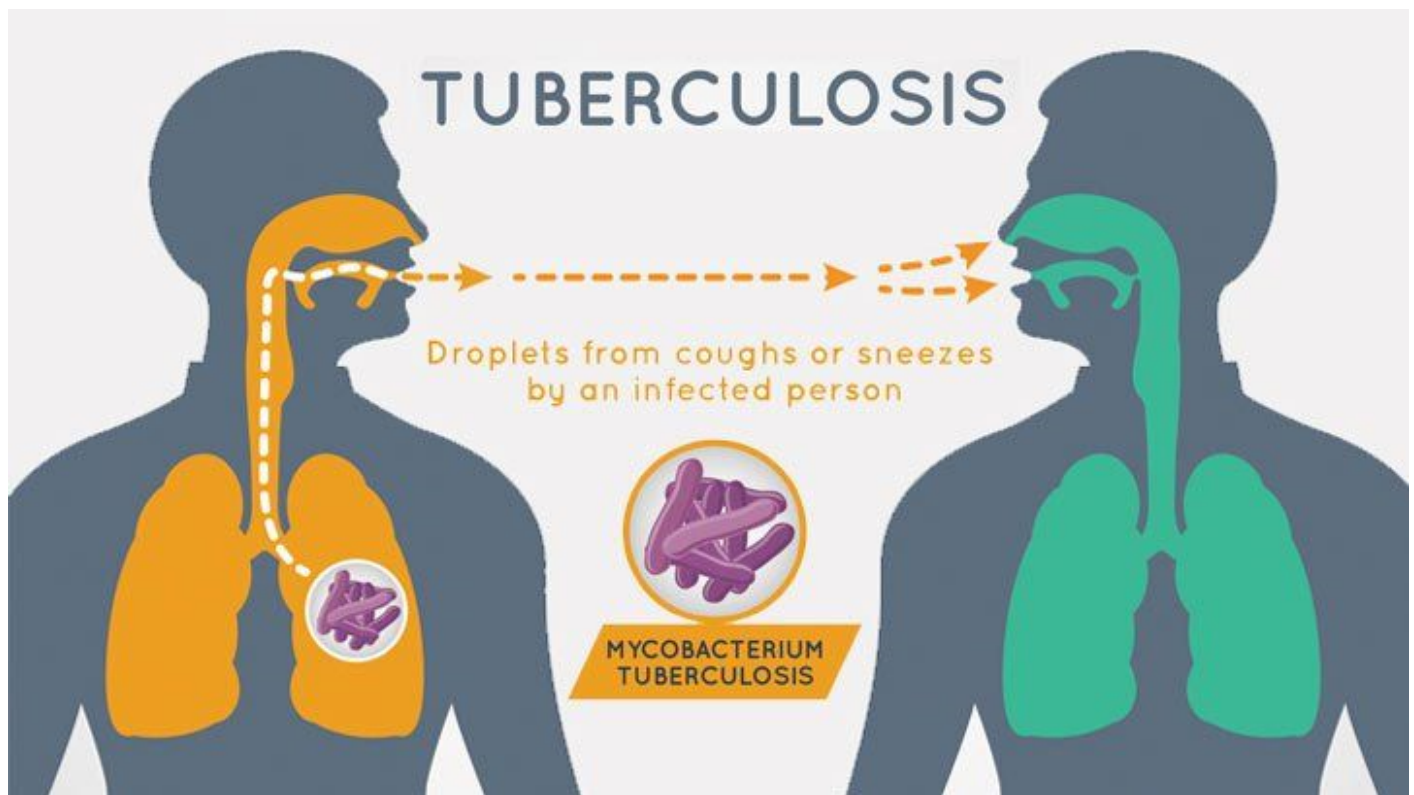
- The technology is compatible with existing plastic manufacturing processes, meaning it could potentially be tested and adopted quickly by the plastics industry.
- The findings will be used in the future by the plastics industry to help make plastic waste more degradable at the end of the life of the product.

### The way to control tuberculosis

(GS Paper 3, Science and Tech)

#### Context:

- Tuberculosis is the worst among endemic diseases, killing 1.5 million people every year (WHO). TB affects adults in their most productive years and therefore impoverishes the family and the nation.
- In India, **the TB capital of the world**, the disease kills some 1,400 persons every day. These are gross estimates, for our health management system has no method to count the exact numbers.



#### TB control program in India:

- In the **1950s and '60s**, India was the **global leader in research in epidemiology, transmission and domiciliary treatment of TB**.
- The National TB Control Programme of 1962 was a district-based one with public-private participation. However, **upscaling the model proved unsuccessful** and the programme failed to control TB.
- After that India began following the WHO under the Revised National TB Control Programme (RNTCP).
- WHO experts, without factoring in the differences between the TB epidemiology of poor and rich countries, used a theoretical construct of TB control to design RNTCP. By 2018, India realized that light at the end of the tunnel was still elusive.

### Flaws in the programme:

- There are obvious flaws in the RNTCP. First, for a programme that is heavily funded by the government, there is **no prescribed method of monitoring the trajectory of TB control**.
- **Contrast this with the National AIDS Control Programme.** Before the National AIDS Control Organization was established, the Indian Council of Medical Research-managed AIDS Control Task Force had a unique method of monitoring the control trajectory, popularly called '**sentinel surveillance**'.
- Through it, India have data on infection prevalence that can be compared across years, starting from 1986 to date. There was pressure from WHO experts to abandon it, but India continued with its own programme.

### Issue of Latent TB in India:

- Second, the **assumption that treating pulmonary TB patients alone** would control TB was epidemiologically fallacious in India.
- The theoretical principle is 'source reduction'. If one patient is the proximate source of infection and disease to another in the community, early diagnosis and treatment would work as source reduction.
- India is a high-burden country. Large proportions of adults carry TB infection in the lung in a dormant condition for life (latent TB).
- Some among them deteriorate and develop **overt TB disease (reactivation TB)**. HIV infection, diabetes, undernutrition, lung damage due to pollution, tobacco smoking, fall in immune functions due to chronic diseases, alcoholism, etc. **accelerate reactivation TB**.

### People's participation:

- Third, RNTCP has failed to elicit people's partnership in TB control.
- In India's AIDS Control Programme, public education was given high priority. Red ribbon clubs in schools and colleges are its legacy. Without people's informed participation, stigma and delay in seeking help will continue.
- Realising that TB was not under control, WHO called for another programme revision through a World Health Assembly Resolution in 2014 to eliminate TB by 2035.
- Emboldened by the promise of an effective strategy, the Prime Minister announced in 2018 that India would eliminate TB by 2025.

### Controlling TB:

- Epidemiologically, human mastery over microbes includes **control, elimination and eradication**. Control refers to the reduction of disease burden through specific interventions to a pre-determined level in a pre-stated time period.
- Evidence will have to show that reduction was due to those interventions and not due to a 'secular trend'.
- Diseases that have social determinants tend to decline over time with better housing, nutrition, education and income — this is what a 'secular trend' is. Globally, by this 'secular trend', the burden of TB had been falling by 1% or 1.5% per year.

### Way Forward:

- Elimination refers to achieving zero frequency of new cases. As India have a huge backlog of latent TB, it cannot eliminate TB, but must aim for a high level of control (lowering from 200 per lakh per year to 50 per lakh per year) and document it with measurement. That will do justice to the Prime Minister's vision. High control is achievable as India have major assets by way of the RNTCP. Trained State and District TB officers are already on the job and we have an extensive network of TB clinics and an army of community and field workers. Once the deficiencies listed above are corrected, India can control TB.

## Helping Sri Lanka more meaningfully

(GS Paper 2, International Relation)

### Context:

- The economic crisis in Sri Lanka has significantly reduced incomes, reduced the availability and affordability of food and thus increased the risk of food insecurity, particularly of the most vulnerable households.

### Vulnerable groups:

- Lower income groups and war-affected families in the north and east have little or no cash reserves, and limited access to resources such as land.
- The problem is more acute among women-headed households, people with disabilities, former combatants, the working class, marginalised caste groups and plantation workers.
- The depreciating Sri Lankan rupee and the lack of foreign exchange have made it enormously difficult for the island to import even the most basic essentials, including food and medicines.
- As a consequence, the cost of staple food items have increased by over 50% in the last six months alone.



#### Indian assistance:

- India has emerged as the foremost partner for Sri Lanka at this time. It has provided assistance of about \$3.5 billion in 2022 to manage the shock caused by this economic catastrophe, compounded by the government's incompetence, mismanagement and corruption.
- As Sri Lankans receive food aid from Tamil Nadu with gratitude, some questions about the transparency and impartiality of the government's distribution of the same have already arisen.
- Some also fear that they might be left out of the government's recovery efforts, led by an International Monetary Fund programme that will likely prescribe austerity.

#### Intervention by Indian government:

- In this context, the Indian government and the people of Tamil Nadu could go beyond relief and **explore supporting an employment guarantee scheme**, drawing from the experiences of the Mahatma Gandhi National Rural Employment Guarantee Act, for a dignified and sustainable recovery of the economy.
- Social safety nets provided by the Sri Lankan state are either inadequate or ineffective.
- There is no functional public distribution system. The maximum monthly household cash transfer (LKR 4,000, or about Rs. 900) provided through Samurdhi, the government's poverty alleviation programme, is grossly insufficient.

#### Food & cash component:

- A work guarantee scheme **assuring working people of 100 to 120 days of work annually** could provide relief. Compensation for this labour could be made 70% in kind, such as rice partly procured in Sri Lanka, along with wheat, daal, and other pulses not available locally, and kerosene. The remaining 30% could be paid in cash to the worker.

- The food component combined with cash will ensure that families are protected from inflation. This will support their emotional, physical and nutritional well-being in a dignified way.
- **‘Work’ could include strengthening agricultural infrastructure** by repairing embankments, channels, and drainage. It could include providing care for children, the elderly and patients.
- This would be especially helpful for working women and those with old and terminally ill family members looking for a career. Internships or on-the-job traineeships could even involve and be funded by the private sector in India through Corporate Social Responsibility projects.

#### **Increasing food production:**

- Resolving this crisis will also require **interventions to increase domestic food production**. Agriculture production fell by almost 50% due to an ill-conceived ban on chemical fertilizers in 2021.
- **India has provided a credit facility to import** fertilizer, which is timely support to incentivise farmers to resume cultivation. But more needs to be done to assist small farmers to re-engage, increase and maximise cultivation.
- Any increase in production will necessarily have a deflationary impact on prices, which could stabilise the prices of food and contribute to improving the broader economic climate.

#### **Cheap credit & Insurance:**

- Earmarking funds for specific purposes, including for provision of cheap credit to small farmers and sharing expertise in good agricultural practices, repairing, remobilising and deploying farm equipment previously gifted by the Indian government, and the management of these schemes will ensure that the benefit of assistance reaches producers directly.
- In addition, devising insurance schemes will give farmers an incentive to cultivate without fear of losses in the event of drought or floods.
- Importantly, the Indian government should ensure that the implementation of these programmes is equitable and impartial, especially in the context of the grievances of the Tamil-speaking minorities who have suffered historic exclusion.

#### **Way Forward:**

- At the end of the war, the Indian housing programme provided significant humanitarian and socio-economic benefits to devastated people in the Northeast and to hill country communities. With 50,000 houses built over five years, people had houses to live in and also livelihoods.
- A strategic intervention such as this, which aids recovery and includes relief with dignity, should be the basis of any future assistance. The housing programme earned goodwill for India.
- A programme guaranteeing employment and supporting production will be a meaningful follow-up to that. Such an intervention will also be in India’s interest.

## **Status of China’s Belt and Road Initiative in South Asia**

**(GS Paper 2, International Relation)**

#### **Why in news?**

- At the recently concluded summit of G7 leaders in Germany, United States President and his allies unveiled their \$600-billion plan called the Partnership for Global Infrastructure and Intelligence (PGII) to build infrastructure projects in developing and middle-income countries.
- This is being seen as a counter to China’s Belt and Road Initiative (BRI), valued at a trillion U.S. dollars by some experts.

#### **What is China’s Belt and Road Initiative?**

- In 2013, Chinese President Xi Jinping, during his visits to Kazakhstan and Indonesia, expressed his vision to build a Silk Road Economic Belt (SERB) and a 21st Century Maritime Silk Road (MSR), to break the “bottleneck” in Asian connectivity.
- The initiative envisioned a **Chinese-led investment of over \$1 trillion in partner countries by 2025**.
- More than 60 countries have now joined BRI agreements with China, with infrastructure projects under the initiative being planned or under construction in Asia, Africa, Europe, and Latin America.

## Roadblocks:

- In recent years, the BRI seems to have experienced a slowing down as annual Chinese lending to countries under the initiative slimmed from its peak of \$125 billion in 2015 to around \$50 to 55 billion in 2021.
- In recent years, multiple countries have renegotiated their loans with China, especially countries that were thrown into economic crises induced by the pandemic.
- As for financing BRI projects, instead of offering aid grants, China offers huge loans at commercial interest rates that countries have to pay within a fixed number of years.
- The west has accused China of debt-trapping by extending “predatory loans” that force countries to cede key assets to China.



## The progress of BRI in South Asia

### Pakistan:

- In 2015 China unveiled the BRI's flagship project and its biggest one in a single country, the China Pakistan Economic Corridor (CPEC).
- Over time, China pledged \$62 billion in low-interest loans and financing from Chinese state-owned banks and the Asian Development Bank (ADB), up from an initial \$46-billion pledge.
- The CPEC involved multiple projects, including the development of a port in the city of Gwadar in the Balochistan province, providing a port to China's Xinjiang province that would be closer than other eastern ports in China.
- China envisioned that **Gwadar would provide it with a position on the Arabian Sea** without having to go through the busy shipping lane of the Malacca Strait. Some other projects included power, the bulk of the investment: transport, and telecommunication.
- Since its inception, the CPEC has been met with multiple roadblocks, and **China seems to have trimmed its \$62-billion pledges to the project.**
- However, multiple reports have shown that shipping activities at the Gwadar Port are almost negligible so far, with only some trade to Afghanistan. The port has also not attracted many Pakistani traders willing to route their freight through it.

### **Sri Lanka:**

- In Sri Lanka, multiple infrastructure projects that were being financed by China before the launch of the BRI in 2013, many of them conceivably came under its fold.
- Costly Chinese projects have come under focus amid Sri Lanka's ongoing economic crisis.
- The \$1.16 billion Central Expressway project connecting with two other highways- the Outer Circle Highway and the Colombo-Katunayake Expressway, and multiple other roads in Dambulla and Kandy, is currently under construction.
- China has pledged to fund 85 per cent of this project, with the Export-Import Bank of China (EXIM) investing \$989 million.
- China also developed the Colombo International Container Terminal (CICT) at the Colombo port, where a Chinese state-owned firm holds an 85 per cent stake under a 35-year Build-Operate-Transfer (BOT) agreement.

### **India-China competition:**

- Sri Lanka in the last couple of years has witnessed competition between India and China in port terminal and energy projects.
- In 2021, Colombo ejected India and Japan out of a deal to develop the East Container Terminal at the Colombo port, getting China to take up the project. It then awarded the project for the Western Side of the Terminal to the Adani Group.
- In March 2022, **Sri Lanka picked India to build three hydropower projects**, scrapping a deal it had signed with China for the same projects last year. India was offering a grant, unlike China's loan.

### **Hambantota port:**

- Some BRI projects in Sri Lanka have been described as white elephants- such as the Hambantota port, a deep seaport on the world's busiest east-west shipping lane, which was meant to spur industrial activity.
- The Sri Lankan government took \$1.4 billion in Chinese loans for the port's expansion. Unable to service the huge loan and incurring \$300 million in losses due to delays, the government handed Hambantota port to a Chinese state-owned company on a 99-year lease in 2017. The rate of traffic at the port currently remains slow.

### **Nepal:**

- Kathmandu formally joined the Belt and Road Initiative in 2017, submitting a list of 35 infrastructure projects it wished China to finance.
- China asked Nepal to narrow the list to an achievable target and after nearly two years of negotiations, nine projects including an ambitious trans-Himalayan rail road from Nepal to China, construction of roads, laying of power transmission lines, hydropower projects, and a technical institute were shortlisted.
- Five years after signing the framework agreement in China, work has not been started on any of the nine projects.
- Nepal has had a complicated relationship with India, especially after the Indian blockade in September 2015.

### **Afghanistan:**

- Afghanistan has not comprehensively been brought into the BRI, despite a Memorandum of Understanding (MoU) to promote BRI projects being signed with China in 2016.
- China had promised investments worth \$100 million in Afghanistan, small in comparison to what it shelled out in other South Asian countries.
- The projects have not materialised so far and uncertainties have deepened after the Taliban takeover last year. Many analysts contended that China would step in with the BRI to fill the void left by the withdrawal of the United States.
- The Taliban regime has called China its "main partner" and China also said that Taliban leaders support BRI and believe it will enhance much-needed infrastructure development in the country, but tangible projects are yet to kick off.

### **Maldives:**

- Situated in the middle of the Indian Ocean, Maldives comprises two hundred Islands, and both India and China are strategically attracted to it.

- One of the most prominent BRI projects undertaken in the Maldives is the **2 km long Sinamale bridge** or the China-Maldives Friendship Bridge- a \$200 million four lane bridge.
- The Maldives' current regime of President Ibrahim Solih has tried to distance itself from the BRI, focusing more on its 'India First' policy.
- India has also in recent years sought greater ties with the Maldives under Prime Minister Narendra Modi's 'Neighbourhood First' policy, funding the Greater Male Connectivity Project in the Maldives by providing a \$100 million grant and a \$400 million loan.

#### **Bangladesh:**

- Bangladesh, which joined the BRI in 2016, has been promised the second-highest belt and road investment by China (about \$40 billion) in South Asia after Pakistan.
- Multiple studies show that Bangladesh has been able to benefit from the BRI while maintaining diplomatic and strategic ties with both India and China.
- It has managed to not upset India by getting India to build infrastructure projects similar to BRI in the country.
- In 2016, when the Chinese government promised Dhaka BRI investment worth around \$40 billion, India followed up in 2017 by extending a \$5 billion line of credit and economic assistance.

#### **BRI Projects in Bangladesh:**

- BRI projects include China-Bangladesh Friendship Bridges, special economic zones (SEZs), the \$689.35 million-Karnaphuli River tunnel project, upgradation of the Chittagong port, and a rail line between the port and China's Yunnan province. Multiple projects have been delayed, however, owing to the slow release of funds by China.
- Besides, the **Marine Drive Expressway was hampered after Sri Lanka blacklisted the Chinese company building it**, over bribery reports. Work on the project is now expected to start in 2022. China also refused to carry out two rail projects after Bangladesh adjusted their costs downwards.