

## Sustainable use of wild species can meet needs of billions: IPBES 9 report (GS Paper 3, Environment)

### Why in news?

- A recent report released by the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)** has stated that **about 50,000 wild species globally** can meet the needs of billions of people.
- The report is the first of its kind and has been conceived after a period of four years.



### Key Findings:

- With **about 50,000 wild species used through different practices**, including more than 10,000 wild species harvested directly for human food, rural people in developing countries are most at risk from unsustainable use, with lack of complementary alternatives often forcing them to further exploit wild species already at risk.
- About 70 per cent of the world's poor population was directly dependent on wild species.
- One out of five source their food from wild plants, algae and fungi, while 2.4 billion depend on firewood for cooking and around 90 per cent of the 120 million population pursuing fisheries rely on small-scale fishing.

### Identities:

- The **use of wild species defines identities and livelihoods** and also holds cultural significance.
- Certain species have cultural importance as they offer multiple benefits that define **tangible and intangible features of people's cultural heritage**.
- Helping indigenous and local communities maintain their ability to use wild species sustainably and protecting their cultural practices associated with them would ensure their survival.
- The use of wild species is also a **source of culturally meaningful employment** for such communities and they have engaged in the trade of wild species and materials since millennia.
- The indigenous people and local communities used local knowledge, practices and spirituality for the sustainable use of wild species.

### Five categories of practices used for wild species:

- The assessment shortlisted **five categories of practices used for wild species** — fishing, gathering, logging, terrestrial animal harvesting which includes **hunting and non-extractive practices** such as observing.
- The report examined specific uses for each category regarding food, materials, medical benefits, energy, recreational and ceremonial purposes and decorations over the past two decades.
- It indicated the increasing use of wild species but added that its sustained use has been varied.

### Example of fisheries:

- Recent global estimates confirm that **about 34 per cent of marine wild fish stocks are overfished** and **66 per cent are fished within biologically sustainable levels**. But within this global picture, there are significant local and contextual variations.
- Countries with robust fisheries management had seen stocks increasing in abundance. The Atlantic bluefin tuna population, for instance, has been rebuilt and is now fished within sustainable levels.
- In countries and regions with low intensity fisheries management measures, the status of stocks was often poorly known. But it was generally believed to be below the abundance that would maximise sustainable food production.
- Many small-scale fisheries are unsustainable or only partially sustainable, especially in Africa for both inland and marine fisheries and in Asia, Latin America and Europe for coastal fisheries.

### Concerns:

- It presented concerns of effective regulations without which the unsustainable use and trade would increase, leading to population collapse.
- It also cited illegal use and illegal trade in wild species which is estimated to be about \$199 billion (Rs 150,000,000 lakh).

### Way Forward:

- The characteristics like integration of diverse value systems, equitable distribution of costs and benefits, changes in cultural norms and social values and effective institutions and governance systems would facilitate the sustainable use of wild species in future.
- It stressed that the sustainable use of wild species needed “**constant negotiation and adaptive management**” along with a common understanding of “**sustainable use**”.

## Forest landscape restoration

(GS Paper 3, Environment)

### Context:

- India celebrates Van Mahotsav or the Forest Festival in the first week of July every year. As part of the annual tree-planting festival, thousands of trees are planted all over the country by different stakeholders from government organisations, civic bodies to individuals.
- The objective behind celebrating Van Mahotsav is to keep local people involved in plantation drives and spread environmental awareness.

### Background:

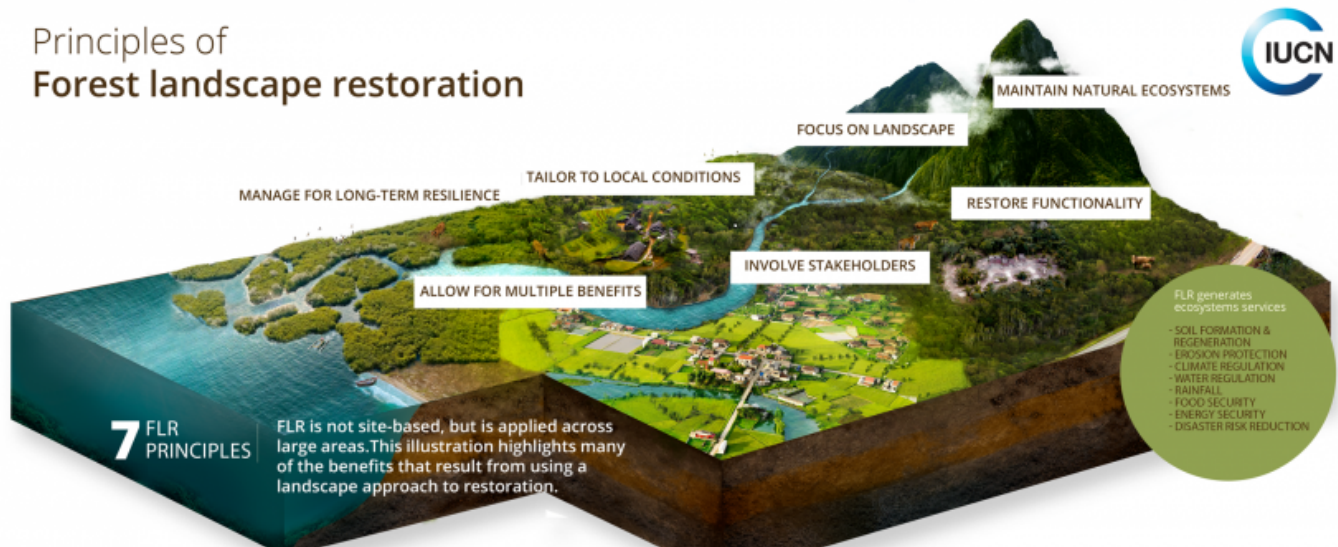
- The history of Van Mahotsav Day goes back to July 1947, when it was first organised by the Punjabi botanist, M.S. Randhawa.
- Subsequently, in 1950, Kanaiyalal Maneklal Munshi, an environmentalist and Union Minister of Agriculture and Food, expanded its reach and national scope.

### Forests, a need:

- In today’s world, forests need to be celebrated more than ever before.
- According to the **International Union for Conservation of Nature (IUCN)**, deforestation and forest degradation contribute around 12% of global greenhouse gas emissions. The total area occupied by primary forests in India has decreased by 3.6%.

## Forest landscape restoration:

- Typically, **governments have relied on afforestation and reforestation** as a means of establishing trees on non-treed land. These strategies have now evolved. The focus is now on **forest landscape restoration**, the process of regaining ecological functionality and improving human welfare across deforested or degraded forest landscapes.
- This approach keeps in mind multiple land uses and people's needs in the short and long terms. Forest landscape restoration seeks to **involve communities in the process of designing and executing** mutually advantageous interventions for the upgradation of landscapes.
- Nearly two billion hectares of degraded land in the world (and 140 million hectares in India) have scope for potential restoration as forest land.



## Diverse species:

- A crucial aspect of this process is to ensure **the diversity of the species while planting trees**. Natural forests with diverse native tree species are more efficient in sequestering carbon than monoculture tree plantations.
- Planting diverse species is also healthier for local communities and their livelihoods. An international study found that diversifying species in forest plantations has a positive impact on the quality of the forests.
- In Punjab, for instance, the community is proactively planting native species such as Jhand ( *Prosopis cineraria*), Desi Kikar ( *Acacia nilotica*) and Pharwan ( *Tamarix aphylla*), which are resilient and acclimatised. And most of these saplings have a high survival rate of 90%, a vital requirement for sustainable reforestation activities.

## A pivotal role:

- Tree planting comes with varied environmental and ecological benefits. Forests are integral in regulating ecosystems, influencing the carbon cycle and mitigating the effects of climate change.
- Annually, **forests absorb roughly 2.6 billion tonnes of carbon dioxide**. This absorption includes nearly 33% of the carbon dioxide released from burning fossil fuels.

## Human dimension:

- But beyond the environmental benefits, there is the human dimension that is at the front and centre. Millions of lives and livelihoods are intertwined with our forests. Forests are a boon for local communities and their livelihoods by functioning as a resource base for goods and services. India is an agrarian economy.
- The forest ecosystems **enrich soil fertility and water availability, enhancing agricultural productivity**, and in turn the rural economy. Tree planting prevents erosion and stems flooding.
- Sustainable forest crops **reduce food insecurity and empower women**, allowing them to gain access to more nutritional diets and new income streams.

- Agroforestry **lessens rural-to-urban migration** and contributes to an increase in resources and household income. Planting trees is deeply linked to the ‘wholistic’ well-being of all individuals, the community, and the planet.

#### **India and programmes:**

- The span **2021-2030 is the UN Decade on Ecosystem Restoration**, emphasising efforts to restore degraded terrestrial ecosystems including forests.

#### **Bonn Challenge:**

- In 2011, the **Bonn Challenge was launched** with a global goal to restore 150 million hectares of degraded and deforested landscapes by 2020 and 350 million hectares by 2030.
- India joined the Bonn Challenge in 2015, pledging to restore 26 million hectares of degraded and deforested land by 2030. An additional carbon sink of 2.5 billion-3 billion tonnes of carbon dioxide equivalent through forest and tree cover is to be created by 2030.

#### **Indian Govt. interventions:**

- There are a myriad government programmes such as **Compensatory Afforestation, the National Afforestation Programme, the National Mission for a Green India (Green India Mission), the Nagar Van scheme and the Forest Fire Prevention and Management Scheme** to name a few.
- There is a **spotlight on youth via the Green Skill Development Programme** for youth who aspire to attain employment in the environment and forest sectors.
- State governments are not far behind either, a case in point being Telangana, which has initiated a large-scale tree planting programme called ‘Telanganaku Haritha Haram’.
- However, forest restoration in India **faces hurdles in terms of the identification of areas for restoration**, a lack of importance accorded to research and scientific strategies in tree planting, stakeholders’ conflicts of interest, and financing.

#### **Way Forward:**

- To be successful, forest landscape restoration must be implemented proactively, bolstering landscapes and forest ecosystems to be durable and adjustable in the face of future challenges and societal needs.
- It also needs the involvement and the alignment of a host of stakeholders including the community, champions, government and landowners.
- The restoration of natural forest ecosystems can be strengthened through participatory governance by engaging stakeholders.
- Vulnerable forest-dependent communities should be factored in, and any effort should be tailored to the local socio-economic context and landscape history of a region.

### **Fast-tracking FTAs: Deeper agreements warrant inter-ministerial coordination** (GS Paper 3, Economy)

#### **Context:**

- India has revamped its strategy towards free trade agreements (FTAs) to boost exports as an engine of growth. It is **currently negotiating/planning several FTAs** with the UK, EU, Canada, Israel, Gulf Cooperation Council, among others.
- To fast-track this process, the fact that the government is mulling a proposal to set up an **inter-ministerial panel**. The warrant for such a panel is to ensure better coordination as differences on crucial and sensitive issues within ministries overseeing different sectors tend to delay FTA negotiations.

#### **Why inter-ministerial panel is needed?**

- The stakeholders with conflicting interests across sectors make negotiations hard. For instance, the **domestic dairy industry’s apprehensions of stiff competition** in dairy products from **Australia and New Zealand** were **responsible in large part for India to walk out of the Regional Comprehensive Economic Partnership** although some other sectors were less hesitant to join the grouping.

- Similarly, opposition from the automobile and electronics industry effectively prevented an early harvest agreement with Thailand 18 years ago to graduate into a full-fledged FTA.

#### Negotiations for new FTA:

- The new thrust towards FTAs saw a comprehensive economic partnership agreement with UAE in March, followed by an economic cooperation and trade agreement with Australia. Talks are on for an agreement with UK by Diwali.
- **India and EU resumed negotiations for an FTA after a gap of about nine years** and are planning to launch the next round of talks in September.
- The ambitiousness in the deals with Australia and UK, however, is only for early harvest agreements or mini-FTAs for trade in a limited set of goods and services. They could be a precursor for a full-fledged FTA but only much later.



#### Compliance with WTO:

- The proposed inter-ministerial panel is clearly intended to facilitate such FTAs as they are higher order agreements that also entail regulatory policy reform.
- The FTA recently signed between EU and New Zealand, for instance, had **provisions for sustainability and labour rights**.
- The proposed FTA discussions with Israel must factor in its **concerns over the violation of intellectual property rights norms**.
- India has also joined the US-led Indo-Pacific Economic Framework which will define shared objectives on trade facilitation, standards for the digital economy and technology, supply chain resilience, decarbonisation and clean energy, infrastructure, and worker standards, among others.
- India might not be on the same page as the US on digital commerce and labour standards, for instance.

#### Way Forward:

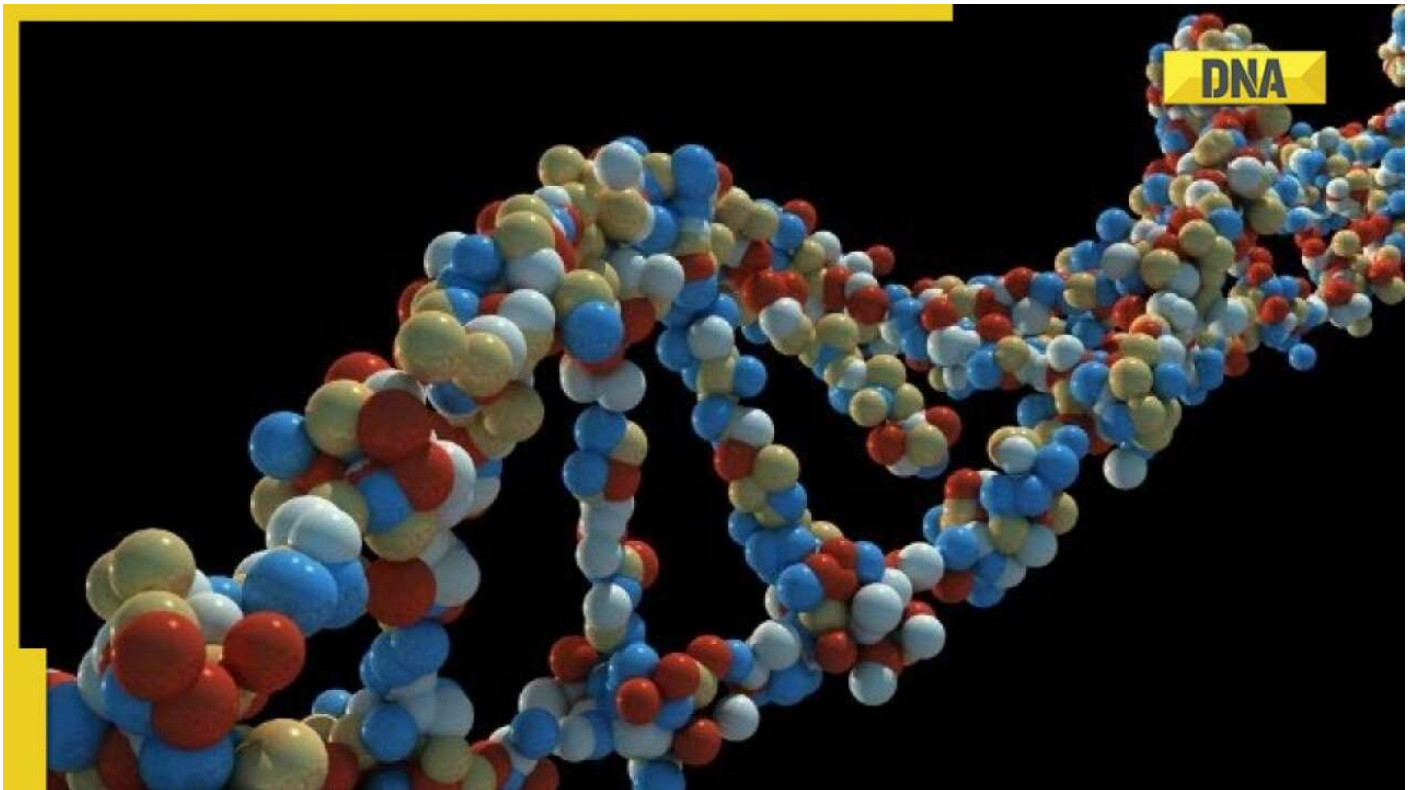
- Such new generation deals clearly call for greater stakeholder coordination within the government, cutting across various ministries and departments, as they entail more than preferential tariff-line liberalisation.

## Machine Learning model from IIT-Madras for personalised cancer therapy

(GS Paper 3, Science and Technology)

### Why in news?

- Researchers at Indian Institute of Technology (IIT)-Madras have developed a **machine learning (ML) algorithm to identify personalised genes** that have the potential to form and drive cancer in individuals.
- The model uses a ‘multiomic’ approach, the combined study of intersectional studies that end with the suffix ‘-omics’.



### PIVOT Model:

- Called ‘Personalized Identification of driVer OGs and TSGs’, or PIVOT, the model identifies personalised drivers of cancer genes and classifies them as either tumour suppressor genes (TSG) or oncogenes (OG) — the two types of genes involved in cancer.
- The algorithm has also identified rarer driver genes that have not been studied enough to be associated with some cancers in large pan-cancer databases.

### How ML works?

- ML works by consuming large datasets and understanding previously identified patterns. It then applies logic to identify new patterns in new (or existing) data.
- For this study, the IIT-Madras researchers worked on datasets that contained genomes of individuals with four kinds of cancers, breast cancer, colorectal adenocarcinoma, lower grade glioma (brain tumours), and lung adenocarcinoma and their identified driver genes and mutations.
- The model classified genes as neutral or drivers, and further labelled them into TSGs and OGs.
- It also identified other trends in data and newer driver genes from medical literature.

### Driver genes

- A **cancer driver gene is one whose mutations increase the net cell growth in body beyond normal**, leading to formation of tumours and cancers.
- These genes that are involved in the cancer-driving mechanism are either tumour suppressors or oncogenes.

**TSGs:**

- TSGs regulate the cell during replication and division, preventing uncontrollable growth resulting in a tumour.
- When TSG mutates, it results in loss of function, i.e. it gets turned off, enabling tumour development.

**Oncogenes:**

- **Oncogenes are those that can cause cancer when activated.** When a cell malfunctions, it is naturally programmed to die.
- But when oncogenes are unregulated or 'have gain of function', i.e. are activated by way of a mutation, malfunctioning cells survive and turn cancerous.
- These mutations are somatic, indicating that they are not inherited genetically. Some genes, like TP53 and PIK3CA, are drivers for multiple types of cancer.

**Outcome:**

- The IIT-Madras researchers trained their PIVOT model with existing validated data sets, reaching high levels of accuracy for predicting the drivers of breast cancer, colorectal cancer, and lung cancer.
- The model uses a supervised approach, with input data labelled, and also labels genes as TSG and OG.
- Apart from the identified driver genes, the algorithm also detected new genes like PRKCA, SOX9, NFKBIA, and PSMD4, which are not already present in large databases but have been found in fewer, or newer.
- The identification of these personalised driver genes helps deliver targeted therapies to people who have cancers without known mutations.

**Future prospects:**

- Such therapies targeted at cancer patients with specific mutations have shown promising results, with a breast cancer trial reaching unprecedented success with tumour growth, and a colorectal cancer trial reaching 100 per cent remission.
- The findings are expected to help in devising more personalised cancer therapies, contributing to the growing field of targeted therapy and immunotherapy trials.