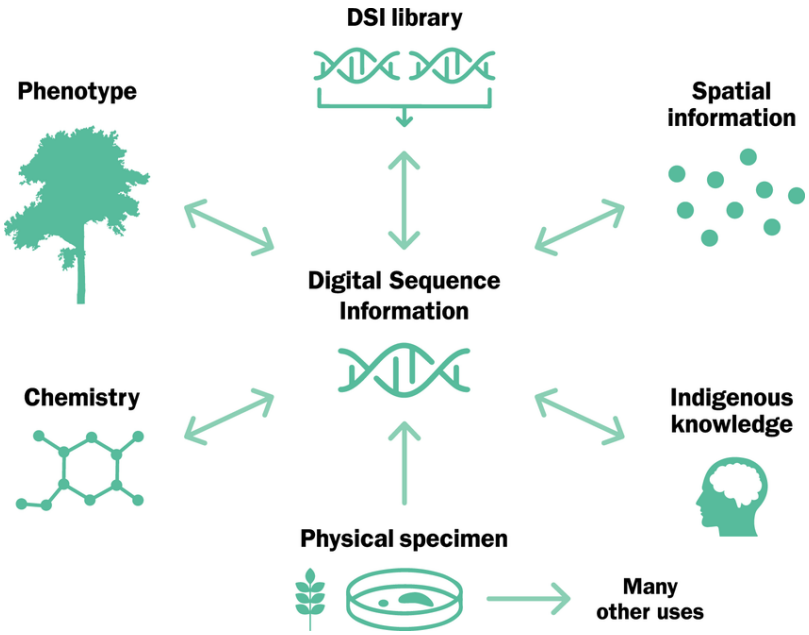
Digital Sequence Information (DSI)

Why in News?

Recently held CoP16 biodiversity conference set up 'Cali fund' to support biodiversity conservation in countries providing digital sequence information.

What is digital sequence information?

- **Genetic sequence** – DNA sequencing is the process of determining the nucleic acid sequence order of nucleotides in DNA.
- The unique genetic codes and sequences in all living organisms hold the information needed for them to develop and function.
- **Digital Sequence Information (DSI) –** It is the digital data of genetic information of plants, animals, microbes.
- **Data types** - It covers any information derived out of these nucleotide or amino acid sequences, genome sequences, their biochemical composition, gene locations, genetic maps.
- **DSI Databases –** It is typically stored in global databases, such as GenBank, EMBL-EBI, or DDBJ.



What are the significances of DSI?

- **Basic science research** - It allows researchers to investigate how genes interact with each other and helps in evolutionary studies.
- **Biodiversity conservation –** It enables scientists to analyze the genetic material of endangered or extinct ones, without requiring physical samples.
- **Disease research –** For identifying and tracking pathogens like viruses, bacteria, and

parasites, which is vital for public health monitoring.

- For example, during the COVID-19 pandemic, the global sharing of the SARS-CoV-2 genome via DSI databases allowed scientists worldwide to develop diagnostics, treatments, and vaccines quickly.
- **Vaccine development** – Vaccine research relies on DSI which helps to analyze and create vaccines for emerging strains.
- **Agriculture and food security –** Crop improvement by identifying genes associated with desirable traits such as drought resistance, pest tolerance, and higher yields in crops.
- **Bioprospecting** – Genetic codes of plants, animals and microbes are used to find new compounds that can be used in pharmaceuticals, cosmetics or other commercial purposes.

Bioprospecting is the systematic and organized search of useful products derived from bio resources including plants, microorganisms, animals that can be developed further for commercialization and overall benefits of the society.

- **Precision medicine –** Where a patient's genetic makeup is analyzed to personalized medicine for effective treatments.
- **Product development -** Industries like pharmaceuticals, cosmetics, agriculture and advanced lab technologies uses DSI to create or improve their products.

Stone-washed denim jeans get their streaked quality from nature - specifically from enzymes developed from microbes found in super salty soda lakes.

Why is it Important to adopt multilateral mechanism in COP – 16?

- At COP16, countries are aiming to create a single, multilateral system focused on generating revenues for conservation from the use of DSI.
- **Access and benefit sharing –** To globally determine the access and benefit sharing mechanism for digital sequence information.

Large companies and other major entities benefiting commercially from DSI will contribute to "the Cali Fund," based on a percentage of their profits or revenues.

- **Global access to genetic resources –** To facilitate the free exchange of genetic data through publicly accessible databases.
- **Complex law system –** The laws to govern the use of genetic material vary widely from country to country complicating the sharing of biological material for research.
- **Intellectual property rights –** To determine the ownership of digitally sequenced genes and how they can be patented or commercialized.
- **Ethical implications –** The vast amounts of DSI available could be used for unethical purposes, such as unauthorized genetic modification or bioweapons development.

- **Revenue for countries** – To enable Species-rich countries, including tropical giants like Brazil and India, capitalizing on their biodiversity through compensation or royalties from companies using DSI in their product.

A U.N.-commissioned study estimated that a charge of 0.1% to 1% on annual revenues of companies using DSI could generate between $1 billion and $10 billion annually.

What lies ahead?

- Determine how DSI revenues would be distributed for use in nature conservation.
- Develop charging mechanism on certain sectors like pharmaceuticals a percentage of their revenue or profit to use DSI databases
- Ensure free access for non-profit research that benefits humanity.
- Support poorer nations in developing their own genetic research.

UNCBD

• **UNCBD –** The Convention on Biological Diversity (CBD) that came into force in **1993,** was an outcome of the **1992 Rio Earth Summit**, along with the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention to Combat Desertification (UNCCD).
• **Frequency of Conference** – ***Biennially*** since 1994.
• **COP 16** – The 16th meeting of the Parties was held in ***Cali, Colombia*** in 2024.
• Originally, Turkey was the host it but after a series of earthquakes in February 2023 they had to withdraw.
• **Ratification** – In total, 196 countries, including India, have ratified the CBD and are, parties to the COP.
• US is the only UN member state not to have ratified the treaty.
• **Objectives of CBD**
- The conservation of biological diversity
- The sustainable use of the components of biological diversity
- The fair and equitable sharing of the benefits arising out of the utilization of genetic resources
• **Supplementary agreements**
- **Cartagena Protocol of 2003** – Ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology.
- **Nagoya Protocol of 2014** – Sharing the benefits arising from the utilization of genetic resources in a fair and equitable way.
• **The International Day for Biological Diversity (IDB)** – On May 22 to increase understanding and awareness of biodiversity issues.
• **Theme (2024)** – Be part of the Plan
• **International Year of Biodiversity** – 2010
• **Decade on Biodiversity** – 2011 to 2020
• **Global biodiversity framework** - The Kunming-Montreal Global Biodiversity Framework (GBF) was adopted in COP 15.
• It sets 4 goals for 2050 and 23 targets for 2030.
To know about UNCBD COP – 15, Click here.

Reference

[The Hindu| COP16 On How To Uses And Pay For Genetic Information]