India-based Neutrino Observatory

The National Green Tribunal (NGT) has upheld the environmental clearance granted in March 2018 to the India-based Neutrino Observatory (INO) a major scientific research facility that is proposed to be constructed in the **Bodi West Hills (Theni district) of Tamil Nadu**.

- However, the project could not be implemented till the approval of the National Board of Wildlife is also received.
- According to Environmentalists such massive scale of construction underground, and controlled blasts, the vibrations from the explosions will badly affect the ecologically **fragile Western Ghats**.
- The site which is near the **Kerala-Tamilnadu border** is close to the **Mathikettan Shola National Park**, and a number of hydroelectric projects, which accounts for the majority of the electricity generation in Kerala.

Neutrino

- Proton, neutron, and electron are tiny particles that make up atoms. The **neutrino is also a tiny elementary particle**, but it is not part of the atom. Such particles are also found to exist in nature.
- Neutrino has a **very tiny mass and no charge**. It **interacts very weakly with other matter particles**. So weakly that every second trillions of neutrinos fall on us and pass through our bodies unnoticed.
- Neutrinos come from the sun (solar neutrinos) and other stars, cosmic rays that come from beyond the solar system, and from the Big Bang from which our Universe originated. They **can also be produced in the lab**.
- The **INO will study atmospheric neutrinos only**. Solar neutrinos have much lower energy than the detector can detect.

India-based Neutrino Observatory (INO)

- INO Project is aimed at building a **world-class underground laboratory** with a rock cover to conduct basic research on neutrino.
- The **Tata Institute of Fundamental Research is the nodal institution**. The observatory is to be built jointly with the Department of Atomic Energy and the Department of Science and Technology.
- The observatory will be **located underground** so as to provide adequate **shielding to the neutrino detector from cosmic background radiation**.
- The operation of INO will have **no release of radioactive or toxic substances**. It is not a weapons laboratory and will have no strategic or defence applications.

Future Applications of Neutrino Science

Basic sciences research is needed to understand the properties of particles before they can be applied. 100 years ago, when the electron was discovered, it had no foreseeable uses. Today, a world without electronics cannot be imagined.

- **Properties of the sun**: The visible light is emitted from the surface of the sun and neutrinos,

which travel close to the speed of light, are produced in the core of the sun. Studying these neutrinos can help us understand what goes on in the interior of the sun.

- **Constituents of the Universe**: Light coming from distant stars can be studied by astronomers, for example, to detect new planets. Likewise, if the properties of neutrinos are understood better, they can be used in astronomy to discover what the universe is made up of.
- **Probing early Universe**: Neutrinos interact very little with the matter around them, so they travel long distances uninterrupted. The extragalactic (originating outside the Milky Way galaxy) neutrinos we observe may be coming from the distant past. These undamaged messengers can give us a clue about the origin of the universe and the early stages of the infant universe, soon after the Big Bang.
- **Medical Imaging**: Apart from direct future uses of neutrinos, there are technological applications of the detectors that will be used to study them. For instance, X-ray machines, MRI scans, etc., all came out of research into particle detectors. Hence the INO detectors may have applications in medical imaging.

National Green Tribunal

- The **National Green Tribunal was established under the National Green Tribunal Act 2010** for effective and expeditious **disposal of cases relating to environmental protection** and conservation of forests and other natural resources.
- It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues.
- The Tribunal is **not bound by the procedure laid down under the Code of Civil Procedure**, 1908, but shall be **guided by principles of natural justice**.
- The Tribunal's dedicated jurisdiction in environmental matters shall provide speedy environmental justice and help reduce the burden of litigation in the higher courts.
- The Tribunal is mandated to make an **endeavour for disposal of applications** or appeals finally **within 6 months of** filing of the same.
- Initially, the NGT is proposed to be set up at five places of sittings and will follow circuit procedure for making itself more accessible.
- **New Delhi is the Principal Place of Sitting of the Tribunal** and Bhopal, Pune, Kolkata and Chennai shall be the other four place of sitting of the Tribunal.