LiDAR survey reports to augment water in forest areas

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In news- Union Environment Minister released LiDAR-based reports mapping out the water requirement within forest areas in 10 states.

Key updates-

- The LiDAR (light detection and ranging) technology was used to create 3-D images of the project areas to recommend soil and water conservation structures.
- The surveys were carried out in **_forest areas in Assam, Bihar, Chhattisgarh, Goa, Jharkhand, Madhya Pradesh, Maharashtra, Manipur, Nagaland, and Tripura._**
- It is a first of its kind and a unique experiment using LiDAR technology which will help augment water and fodder in jungle areas thereby reducing human-animal conflict.
- The project was awarded to **WAPCOS, a PSU under the Jal Shakti Ministry** for implementation in 26 states.

About LIDAR-

- **LiDAR, or light detection and ranging**, is a remote sensing method used for measuring the exact distance of an object on the earth's surface.
- It was first used in the 1960s when laser scanners were mounted to aeroplanes.
- LiDAR uses a pulsed laser to calculate an object's variable distances from the earth surface.
- The time the laser light takes to return to the LiDAR source is calculated.
- The **distance of the object=(Speed of Light x Time of Flight)/ 2**
- There are **three primary components of a LiDAR instrument**

- – the scanner, laser and GPS receiver.
  - Other elements that play a vital role in the data collection and analysis are the photodetector and optics.
  - LiDAR systems are divided into **two types based on its functionality** – Airborne LiDAR and Terrestrial LiDAR.
  - **Airborne LiDAR is installed on a helicopter or drone** for collecting data.
  - **Terrestrial LiDAR systems are installed on moving vehicles or tripods on the earth surface** for collecting accurate data points.
  - These are quite common for observing highways, analysing infrastructure or even collecting point clouds from the inside and outside of buildings.

Applications of LIDAR-

1. Agriculture: LiDAR can be used to create 3D elevation maps of a particular land. This can be converted to create slope and sunlight exposure area maps. This information can be used to identify the areas which require more water or fertilizer and help the farmers to save on their cost of labor, time and money.
2. River Survey: Water penetrating green light of the LiDAR can be used to see things underwater and helps create a 3D model of the terrain. It helps in monitoring the floodplains.
3. Modelling Pollution: LiDAR wavelength is shorter and it operates in ultraviolet, visible region or near infrared. This helps to image the matter which is of the same size or larger than the wavelength. So LiDAR can detect pollutant particles of carbon dioxide, Sulphur dioxide, and methane.
4. Archeology and Building Construction: LiDAR plays an important role for the archeologist to understand the surface. LiDAR can detect micro-topography that is hidden by vegetation which helps archeologists to

understand the surface.

5. Ground-based LiDAR technology can be used to capture the structure of the building. This digital information can be used for 3D mapping on the ground which can be used to create models of the structure.

6. Oceanography: Other than locating objects, LiDAR is also used for calculating phytoplankton fluorescence and biomass in the ocean surface, which otherwise is very challenging.

7. Astronomy: LiDAR is also capable of mapping the surfaces of celestial bodies — it was used to generate a precise global topographic survey of Mars in 2001.

8. Autonomous vehicles: LiDAR sensors determine the exact position of obstacles in the surrounding environment, generating data that will steer vehicles in the right direction to avoid making an impact.

9. Green Energy: LiDAR attached to the turbine itself is used to calculate the direction and strength of wind, and if necessary will change the direction of the blade in order to generate more power.