

1. **eye** (verb) – watch, observance, lookout/powers of observation, observation, perception.
2. **pre-dawn** (adjective) – taking place before dawn (early morning).
3. **a feather in one's cap** (phrase) – an achievement to be proud of.
4. **forestry** (noun) – forest management, forest planting, tree growing/forestation.
5. **deforestation** (noun) – it is when humans remove or clear large areas of forest lands and related ecosystems for non-forest use.
6. **overcast** (adjective) – overclouded, cloudy, dull.
7. **rely on** (phrasal verb) – depend on; resort to, have recourse to.
8. **susceptible** (adjective) – subject to, prone to, at risk of.
9. **haze** (noun) – fog, smog; very fine solid particles (smoke, dust) or liquid droplets (moisture) suspended in the air, slightly limiting visibility.
10. **passive** (adjective) – (a satellite) receiving/reflecting radiation from a transmitter or target rather than generating its own signal.
11. **synthetic aperture radar (SAR)** (noun) – it is a coherent mostly airborne or spaceborne side looking radar system which utilizes the flight path of the platform to simulate an extremely large antenna or aperture electronically, and that generates high-resolution remote sensing imagery.
12. **indigenously** (adverb) – in an indigenous (originating from native/local) manner, something is produced in a particular region/country.
13. **discrimination** (noun) – differentiation, distinction, telling the difference.
14. **surveillance** (noun) – view, scrutiny, monitoring.
15. **enhance** (verb) – increase, improve, reinforce.

## Eye in the sky: on RISAT-2B

### RISAT-2B will enhance India's monitoring capabilities for civil and military purposes

With the **successful pre-dawn launch of RISAT-2B satellite on May 22**, the Indian Space Research Organisation (ISRO) has added another feather to its cap. The satellite will enhance India's capability in crop monitoring during the monsoon season, forestry mapping for forest fires and deforestation, and flood mapping as part of the national disaster management programme. Given that overcast skies are a constant during the monsoon season and during times of flood, the ability to penetrate the cloud cover is essential. While optical remote sensing that relies on visible light for imaging gets obstructed by clouds, RISAT-2B will not. Much like the RISAT-1 satellite that was launched by ISRO in April 2012, RISAT-2B will also use microwave radiation. Unlike visible light, microwaves have longer wavelength and so will not be susceptible to atmospheric scattering. Microwave radiation can thus easily pass through the cloud cover, haze and dust, and image the ground. Hence, RISAT-2B satellite will be able to image under almost all weather and environmental conditions. Since it does not rely on visible

light for imaging, it will be able to image the ground during both day and night. The satellite does not have passive microwave sensors that detect the radiation naturally emitted by the atmosphere or reflected by objects on the ground. Instead, RISAT-2B will be transmitting hundreds of microwave pulses each second towards the ground and receiving the signals reflected by the objects using radar. The moisture and texture of the object will determine the strength of the microwave signal that gets reflected. While the strength of the reflected signal will help determine different targets, the time between the transmitted and reflected signals will help determine the distance to the object.

The RISAT-2B satellite uses X-band synthetic aperture radar for the first time; the synthetic aperture radar was developed indigenously. Unlike the C-band that was used by RISAT-1, the shorter wavelength of the X-band allows for higher resolution imagery for target identification and discrimination. Since it has high resolution, the satellite will be able to detect objects with dimensions of as little as a metre. This capacity to study small objects and also movement could be useful for surveillance. As K. Sivan, ISRO Chairman and Secretary, Department of Space, had said last month, the satellite could be used for civil and strategic purposes. RISAT-2B will have an inclined orbit of 37 degrees, which will allow more frequent observations over the Indian subcontinent. With ISRO planning to launch four more such radar imaging satellites in a year, its ability to monitor crops and floods as well as engage in military surveillance will be greatly enhanced.