

# **SQUARE KILOMETER ARRAY (SKA)**

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#### **Context:**

Square Kilometer Array (SKA), the world's largest radio telescope in the making, has carried out its first observations, signalling that at least a part of the yet-to-be-completed facility has become functional.

### **Background:**

The SKA is an international science project with headquarters in the United Kingdom. In December last year, India, which has been collaborating on the project since its inception, became a full member country in the international consortium building this telescope across two continents.

## **About Square Kilometer Array (SKA):**

- 1. The Square Kilometre Array (SKA) is an ambitious international project aimed at building the world's largest and most sensitive radio telescope.
- 2. Purpose: The SKA is designed to explore the universe in unprecedented detail, addressing fundamental questions in astrophysics, cosmology, and even the search for extraterrestrial life.
- 3. Location: The SKA will be split between two primary sites: the Karoo region in South Africa and the Murchison region in Western Australia.

## Structure and Technology:

- 1. Components: The SKA will consist of two main arrays:
  - SKA-Mid: Located in South Africa, this array will include 197 large dish antennas to observe mid-frequency radio waves (350 MHz to 15.4 GHz).
  - SKA-Low: Located in Australia, this array will feature 131,072 low-frequency (50 350 MHz) antennas designed to detect radio waves from the early universe.
  - Collecting Area: The combined collecting area of the SKA will be approximately one square kilometre, making it 50 times more sensitive than any current radio telescope.
  - Interferometry: The SKA will use a technique called aperture synthesis, linking multiple telescopes to act as a single, large telescope. This will provide extremely highresolution images.

#### **Scientific Goals:**

- 1. Cosmology: Study the formation and evolution of the first stars and galaxies after the Big Bang.
- 2. Dark Matter and Dark Energy: Investigate the nature of dark matter and dark energy, which make up most of the universe's mass-energy content.
- 3. Astrobiology: Search for signs of extraterrestrial life by detecting bio-signatures and techno-

signatures.

4. Fundamental Physics: Test Einstein's theories of gravity and explore the properties of gravitational waves.

