



Square Kilometre Array Telescope

Why in News

Recently, the **Square Kilometre Array Observatory (SKAO)** Council held its inaugural meeting and approved the establishment of the **world's largest radio telescope**.

- The new venture is being deemed as important following the collapse of one of the most prolific radio telescopes in the world, the **Arecibo in Puerto Rico**, in December last year.
- **SKAO** is a new **intergovernmental organisation dedicated to radio astronomy** and is **headquartered in the UK**.
 - At the moment, organisations from ten countries are a part of the SKAO.
 - These include **Australia, Canada, China, India, Italy, New Zealand, South Africa, Sweden, the Netherlands and the UK**.

Key Points

▪ Radio Telescopes:

- Radio telescope, **astronomical instrument** consisting of a **radio receiver and an antenna system** that is used to detect radio-frequency radiation between wavelengths of about **10 metres (30 megahertz [MHz]) and 1 mm (300 gigahertz [GHz])** emitted by extraterrestrial sources, such as **stars, galaxies, and quasars**.
- Unlike optical telescopes, **radio telescopes can detect invisible gas** and, therefore, they can **reveal areas of space that may be obscured by cosmic dust**.
 - **Cosmic dust** consists of tiny particles of solid material floating around in the space between the stars.
- Since the first radio signals were detected in the 1930s, astronomers have used radio telescopes to detect **radio waves** emitted by different objects in the universe and explore it.
- According to the **National Aeronautics and Space Administration (NASA)**, the field of **radio astronomy evolved after World War II** and became one of the most important tools for making astronomical observations.

▪ The Arecibo Telescope:

- The Arecibo telescope in Puerto Rico, which was **the second-largest single-dish radio telescope** in the world, collapsed in December 2020.
 - China's **Sky Eye** is the world's largest single-dish radio telescope.
- The telescope **was built in 1963**.
- Because of its powerful radar, scientists employed it to **observe planets, asteroids and the ionosphere, making several discoveries** over the decades, including **finding prebiotic molecules in distant galaxies, the first exoplanets, and the first-millisecond pulsar**.

▪ Square Kilometer Array (SKA) Telescope:

- **Location:**
 - The telescope, proposed to be the largest radio telescope in the world, will be **located in Africa and Australia.**
- **Development:**
 - The development of SKA will use the results of various surveys undertaken using another powerful telescope called the **Australian Square Kilometre Array Pathfinder (ASKAP).**
 - ASKAP is developed and operated by the Australia's science agency **Commonwealth Scientific and Industrial Research Organisation (CSIRO).**
 - This telescope, which has been fully operational since February 2019 **mapped over three million galaxies** in a record 300 hours during its first all-sky survey conducted late last year.
 - ASKAP surveys are **designed to map the structure and evolution of the Universe**, which it does by observing galaxies and the hydrogen gas that they contain.
- **Maintenance:**
 - Its operation, maintenance and construction will be overseen by **SKAO.**
- **Cost and Completion:**
 - The completion is expected to take nearly a decade at a cost of over **1.8 billion pounds.**
- **Significance:**
 - Some of the questions that scientists hope to address using this telescope:
 - The **beginning of the universe.**
 - How and when the first stars were born.
 - The **life-cycle of a galaxy.**
 - Exploring the possibility of **detecting technologically-active civilisations elsewhere** in our galaxy.
 - Understanding where **gravitational waves** come from.
- **Function:**
 - As per NASA, the telescope will accomplish its scientific goals by **measuring neutral hydrogen over cosmic time**, accurately **timing the signals from pulsars in the Milky Way**, and **detecting millions of galaxies out to high redshifts.**

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