



# drishti

## 163348 (2002 NN4): A Near-Earth Asteroid

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### Why in News

Recently, **the National Aeronautics and Space Administration (NASA)** has announced that a giant **asteroid** called as **163348 (2002 NN4)**, is expected to pass Earth on 6<sup>th</sup> June 2020.

However, it is approaching the Earth within the **safe limit of distance**.

### Key Points

- **163348 (2002 NN4):**
  - It was discovered in July 2002 and is expected to approach the earth in June 2020.
  - The asteroid is estimated to be between **250-570 meters in diameter**.
  - The asteroid is a **Near-Earth Object** and classified as a **Potentially Hazardous Asteroid (PHA)**.
- **Near-Earth Objects (NEOs):**
  - NEOs are **comets and asteroids** pushed by the **gravitational attraction of nearby planets into orbits** which allow them to enter the Earth's neighbourhood.
  - These objects are **composed mostly of water ice** with embedded dust particles.
  - NEOs **occasionally approach close to the Earth** as they orbit the Sun.
  - NASA's **Center for Near-Earth Object Study (CNEOS)** determines the times and distances of these objects, when their approach to the Earth is close, through the Asteroid Watch Widget.

- **Potentially Hazardous Asteroid (PHA):**
  - It means that an asteroid has the potential to make **threatening close approaches to the Earth.**
  - Specifically, all asteroids with a **Minimum Orbit Intersection Distance (MOID) of 0.05 AU** (which is about 7,480,000 Km) or less and an **Absolute Magnitude (H) of 22.0** (about 150 mt in diameter) or less are considered PHAs.
    - **Minimum Orbit Intersection Distance** is a method for calculating the **minimum distance between two almost overlapping elliptical orbits.**
    - **The Astronomical Unit (AU)** is the distance between the Earth and the Sun and is roughly 150 million km.
    - The **absolute magnitude** is a measure of the star's luminosity i.e. the **total amount of energy radiated** by the star every second.
- **Chances of hitting the earth and related Concerns:**
  - According to NASA, the objects with large size pose a **great risk to Earth** due to the **level of devastation and the impact** they can cause.
  - Less than half of the estimated 25,000 NEOs that are 140 metres or larger in size have been found to date.
    - NASA's **Near-Earth Object Observations Program** finds, tracks and characterises over 90% of the predicted number of NEOs that are 140 metre or larger in size.
  - However, no asteroid **larger than 140 metre has a “significant” chance of hitting** the Earth for the **next 100 years.**

## Asteroids

- Asteroids orbit the Sun and are small bodies in the solar system.
- They are made up of metals and rocks.
- They tend to have shorter and elliptical orbits.
- They do not produce a coma or tail atmosphere.
- The **asteroid belt** is a torus-shaped region in the Solar System, located roughly between the orbits of the planets Jupiter and Mars.

## Comet

- Comets also orbit the Sun and are relatively small bodies of the solar system.
- They are made up of ice and hydrocarbons.
- Comets have an eccentric orbit.

- When comets approach the sun, some part of their ice melts and the other materials vapourise due to the heat of the sun. This results in a glowing halo that extends outwards through space.

Therefore, a thin atmospheric tail is formed when close to the Sun.

### **Significance:**

- The scientific interest in **comets and asteroids** is largely due to their status as **relatively unchanged remnant debris from the solar system** formation process over **4.6 billion years ago**. Therefore, they offer clues about the **chemical mixture** from the planets formed.
- Significantly, among all the reasons that will eventually cause the extinction of life on Earth, **an asteroid hit is widely acknowledged** as one of the likeliest.

Over the years, scientists have suggested different ways to ward off such a hit, such as blowing up the asteroid before it reaches Earth, or deflecting it off its Earth-bound course by hitting it with a spacecraft.

### Way Forward

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- It is not necessary that asteroids classified as PHAs will impact the Earth. It only means there is a possibility of a threat.
- By **monitoring these PHAs and updating their orbits as new observations**, it is possible to **predict the close-approach statistics and thus their Earth-impact threat**.

**Source: IE**