Moon’s Wobble Effect

Why in News

Recently, the **National Aeronautics and Space Administration** (NASA) has highlighted **Moon’s Wobble** as a **potential problem in the near future.**

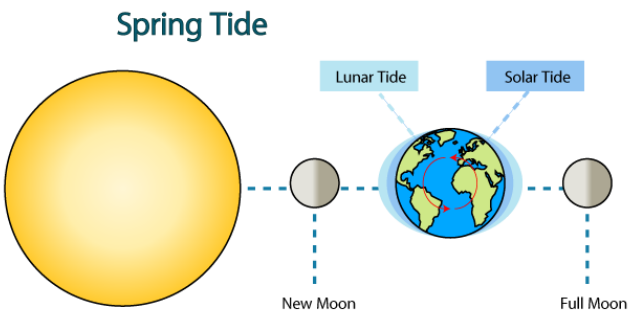
Key Points

- **Moon’s Wobble:**
  - When the Moon makes its **elliptical orbit,** its **velocity varies and alters causing our perspective of the "light side"** to appear at **slightly different angles.** This is what it calls the Moon’s wobble or that is how it appears to our eyes.
  - It is a **cyclical shift in the moon’s orbit,** it is a **regular swaying (Oscillation) in the moon’s orbit.**
  - It was first documented **way back in 1728.** This wobble takes **over an 18.6-year** period to complete. It acts as a background of **sea level rise.**
- **Impact of Wobble on Earth:**
  - The moon wobble impacts the gravitational pull of the moon, and therefore, indirectly influences **the ebb and flow of tides** on the Earth.
  - Each wobble cycle has the **power to amplify and suppress the tides on Earth.**
    - During **half of the Moon’s orbit of 18.6 years, the Earth's regular tides are suppressed** i.e. high tides are lower than normal and low tides higher than normal (Current situation).
    - In the **other half, the effect is reversed, which is called the tide-amplifying phase** of the Moon.

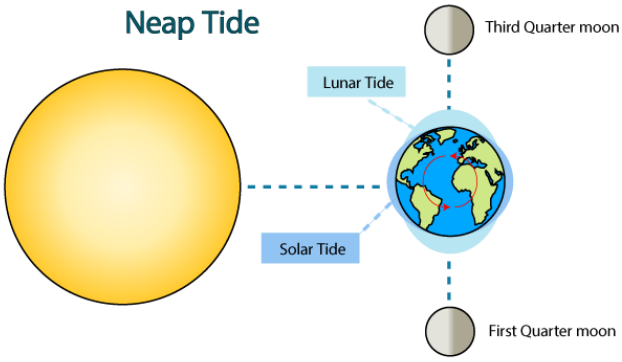
- **Related Concerns:**
  - The **lunar cycle is expected to shift again by mid-2030,** and in the coming phase, the **tides will amplify once again.**
  - The upcoming changes in the lunar cycle will pose a serious threat, as the amplified **high tides coupled with the rising sea levels** will make the risk of flooding far greater across **all coastal regions of the globe.**

    It raises **the baseline,** and the more the baseline is raised, the smaller the weather event to cause flooding.
  - The **high tide-associated floods**—also known as nuisance floods or sunny day floods—**may occur in clusters that could last for months** or even for longer periods.
  - This surge will be closely associated with the **position of the Moon, Earth and the Sun.**

Tides



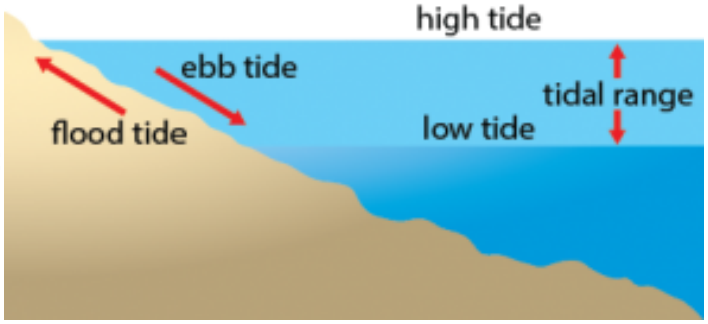
- **About:**



  Tides can be defined as the **alternate rise and fall of the ocean water.**
- **Occurrence:**

  It is caused by the combined effects of the **gravitational force** exerted on Earth **by the Sun,** the gravitational force exerted on Earth **by the Moon and rotation of the Earth.**

- **Types:**
  - **Spring Tide:** It occurs during the **full moon and new moon days** when the sun, the moon and the earth are in the same line twice each lunar month all year long, without regard to the season.
  - **Neap Tide:** It occurs when the moon is in **its first and last quarter,** the ocean waters get drawn **in diagonally opposite directions** by the gravitational pull of sun and earth resulting in low tides.
- **Stages of Tidal Changes:**



  - **High tide** is the stage when the tidal crest arrives at a particular location on shore, raising the local sea level.
  - **Low tide** is the stage when the trough arrives, lowering the local sea level.
  - **Flood tide** is a rising or incoming tide between low tide and high tide.
  - **Ebb tide** is a falling or outgoing tide between high tide and low tide.

    The vertical distance between high tide and low tide is the tidal range.
- **Impact:**
  - Tides affect other aspects of **oceanic life, including the reproductive activities** of fish and ocean plants.
  - High tides **help in navigation.** They raise the water level close to the shores which helps the **ships to arrive at the harbour more easily.**
  - Tides stirr the ocean water that **makes habitable climatic conditions** and balance the temperatures on the planets.
  - The fast movement of water **during the inflow and outflow** will provide a source of renewable energy to communities living along the coast.

Source: IE