

Tides - UPSC Geography Notes

What is the tide?

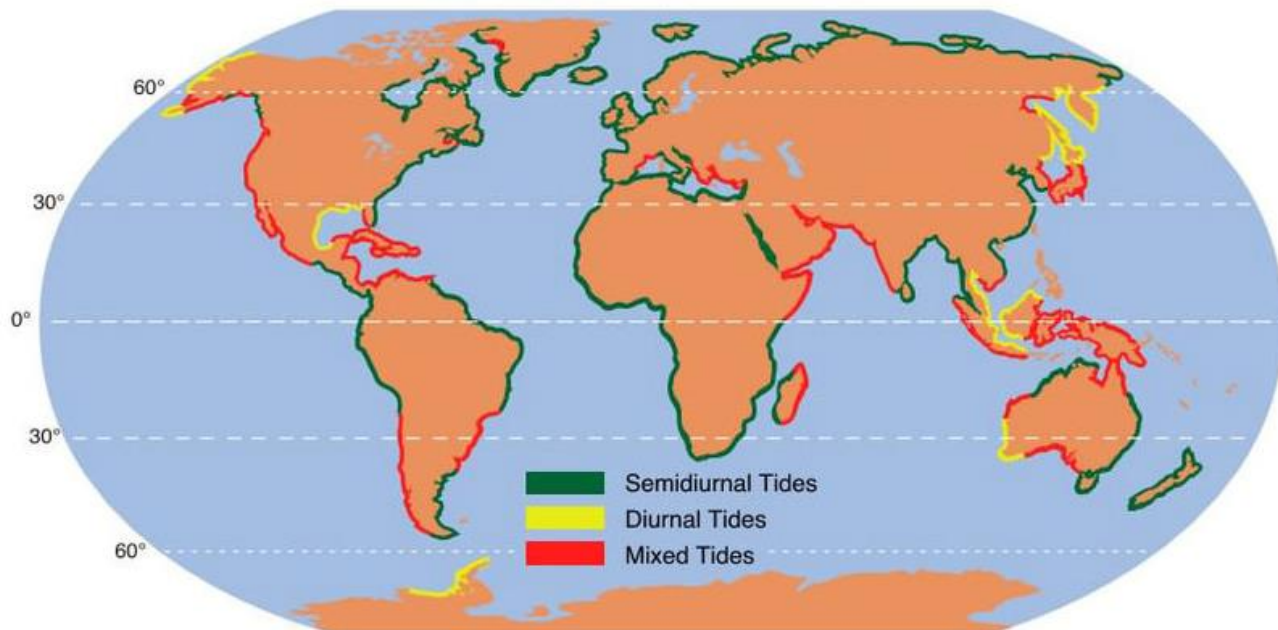
Tides can be defined as the alternate rise and fall of the ocean water. It is caused by the combined effects of :

1. The gravitational force exerted on Earth by the Sun
2. The gravitational force exerted on Earth by the Moon
3. Rotation of the Earth

What are the types of tides & what causes these tides?

The table below briefs the types of tides followed by detailed explanations:

Types of Tides	
Tides Based on Frequency	Semi-Diurnal Tides
	Diurnal Tides
	Mixed
Tides Based on the Position of Earth, Sun, and the Moon	Spring Tides
	Neap Tides



Semi-Diurnal Tides

A semi-diurnal tidal cycle is the one with two nearly equal high tides and two low tides each day. The interval between the high and the low tides is of around 12 hours and 25 minutes. Semi-Diurnal Tides are most widespread in the Indian Ocean. The other prevalent coasts where semi-diurnal tides are experienced are:

- Eastern African Coast
- Bay of Bengal

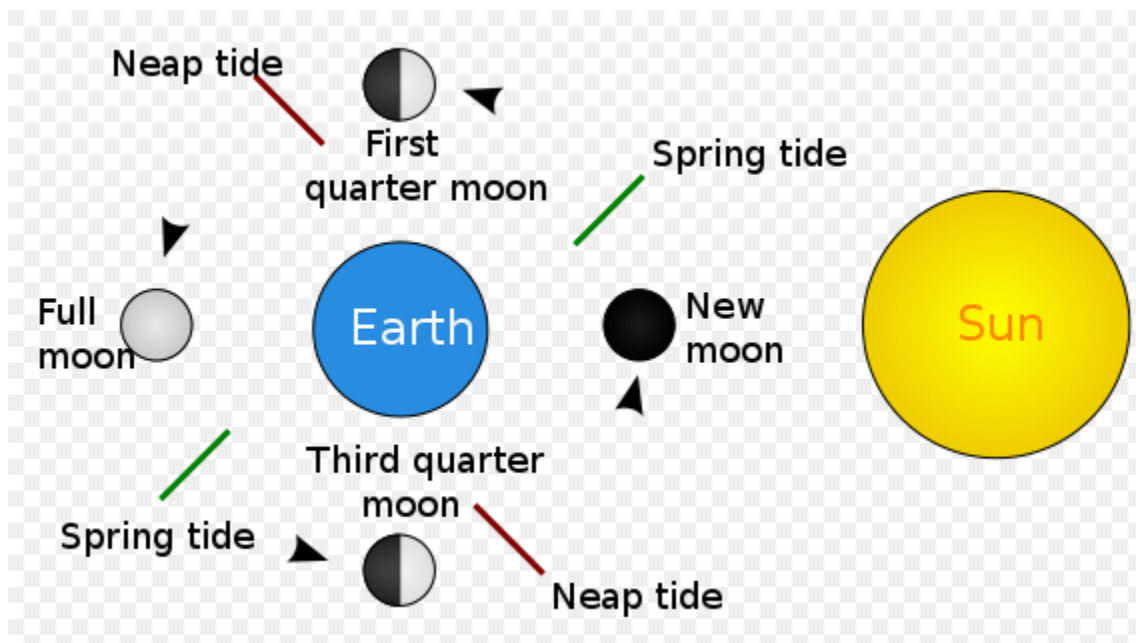
Diurnal Tides

It means four tides in a day. Two tides by the sun and two by the moon. Spring Tide It is an exceptionally high tide generated by the complementary factor played by the Sun with respect to the moon. It should be noted that when Sun, Moon, and Earth are in the same line, the position is known as the Syzygy. This syzygy can be of 2 types :

1. Conjunction: when the moon and sun are on the same side
2. Opposition: When the moon and sun are on the opposite side In both of these conditions, the magnitude of the tide will be equally high.

Mixed Tides

A tidal cycle with two unequal high and low tides lead to the formation of the mixed tidal cycle, or simply called mixed tide. This tidal cycle has both semi-diurnal and diurnal oscillations. It is widely observed in the Gulf of Mexico and the Caribbean Sea. Southeastern Brazilian coast also witnesses mixed tides.



Spring Tides

Spring tides are formed when the sun and the moon are in line with each other and pull the ocean surface in the same direction. This leads to higher high tides and lowers low tides and such tide is called a spring tide. In a lunar month, it occurs twice. It is also known by the name of 'King Tide.'

Note: The aspirants should know that the spring season has nothing to do with spring tides. The word 'Spring' in spring tides means 'springing forth.' These occur in full or new moon days. In both new moon or full moon days, the sun's gravitational pull is added to the moon's gravitational pull on Earth, causing the oceans to bulge a bit more than usual. This results in 'higher' high tides and 'lower' low tides.

Neap Tides

It occurs seven days after the spring tide. The prominent point is that the sun and the moon are at the right angle to each other. This tide occurs during the first and the last quarter of the moon. The gravitational pull of the moon and the resulting oceanic bulge is cancelled out by the gravitational pull of the sun and its resulting oceanic bulge. Also, in contrast to spring tides, the high tides are 'lower' and the low tides are comparatively 'higher' in neap tides.

How do tides work?

The mechanism of tides could be understood by understanding the gravitational force of the Sun and the Moon. These bodies experience the gravitational pull over each other depending upon their mass and the distance between them. Since the Sun is far away from the Earth as compared to the Moon. Hence, the Sun's gravitational pull is lesser over the Earth than the moon. Thus, the moon determines the magnitude of the tide. It is supposed that only the water bodies are pulled by the gravitational pull, however, it is not the fact. It is both the land and water bodies that get pulled by the gravitation. Since the relative pull of the land

is less in comparison to that of water, the effect of gravitation on the water bodies is more. It should be noted that the magnitude of ant tide is determined by the relative position of the Moon, the Sun, and the Earth.

Impact of Tides

1. Tides raise the level of seawater and hence exposes a large part of the ocean for erosion
2. It is helpful for the tidal ports that have shallow water which is a constraint for the big ships to enter. Tidal currents are a very potential source of tidal energy which is harnessed by many developed countries on a very large scale and to some extent in India as well. It can be devastating in cases where the tide gets too huge and results in the flooding of the nearby coastal regions. Tides are very helpful for ecosystems such as the mangrove forests and coral reefs to grow and sustain.

Characteristics of Tides

Tide changes as per the 4 stages given below.

1. **Flood Tide** – Over a period of several hours there will be a rise in sea level.
2. **High Tide** – This is a stage where the water reaches its maximum level.
3. **Ebb Tide** – This is a stage where sea level keeps receding over several hours.
4. **Low Tide** – The Level of Seawater stops receding.

What is a tidal bulge?

The side of the earth that is nearest to the moon witnesses one tidal bulge. The other side of the earth that is farthest to the moon witnesses the second tidal bulge. These tidal bulges are high tides. The water in the ocean is pulled towards the moon under the impact of the gravitational pull. That creates a tidal bulge.