

UPSC Civil Services Examination

UPSC Notes [GS-I]

Topic: Forces Affecting Velocity and Direction of Wind [Geography Notes For UPSC]

Forces Affecting the Velocity and Direction of Wind

- The air in motion is called wind.
- The wind blows from high pressure to low pressure.
- The wind at the surface experiences friction.
- The rotation of the earth also affects the wind movement.
- The force exerted by the rotation of the earth is known as the Coriolis force.
- Therefore, the horizontal winds near the Earth's surface respond to the combined effect of three forces:
 - The Pressure Gradient Force
 - The Frictional Force
 - The Coriolis Force

Pressure Gradient Force

- The differences in atmospheric pressure generate a force.
- The rate of change of pressure with regard to distance is known as the pressure gradient.
- The pressure gradient is weak where the isobars are distant and strong where the isobars are close by to each other.

Frictional Force

- It impacts the speed of the wind.
- The friction is maximum at the surface and minimal over the sea surface.
- The influence of frictional force usually stretches up to an elevation of 1 – 3 km.

Coriolis force

- The rotation of the earth about its axis affects the direction of the wind and this force is called the Coriolis force.
- It is directly proportional to the angle of latitude.
- It deflects the wind to the left direction in the southern hemisphere and the right direction in the northern hemisphere.
- The deflection is more when the wind velocity is high.
- It is maximum at the poles and is absent at the equator.
- The force acts perpendicular to the pressure gradient force.
- The pressure gradient force is perpendicular to an isobar.
- The higher the pressure gradient force, the more is the speed of the wind and the larger is the deflection in the direction of wind happens.
- As a result of these two forces functioning perpendicular to each other, in the low-pressure areas the wind blows around it.
- The Coriolis force is zero at the equator and the wind blows perpendicular to the isobars.