

# The Journey of an Ocean Wave: From Deep Water to the Shoreline

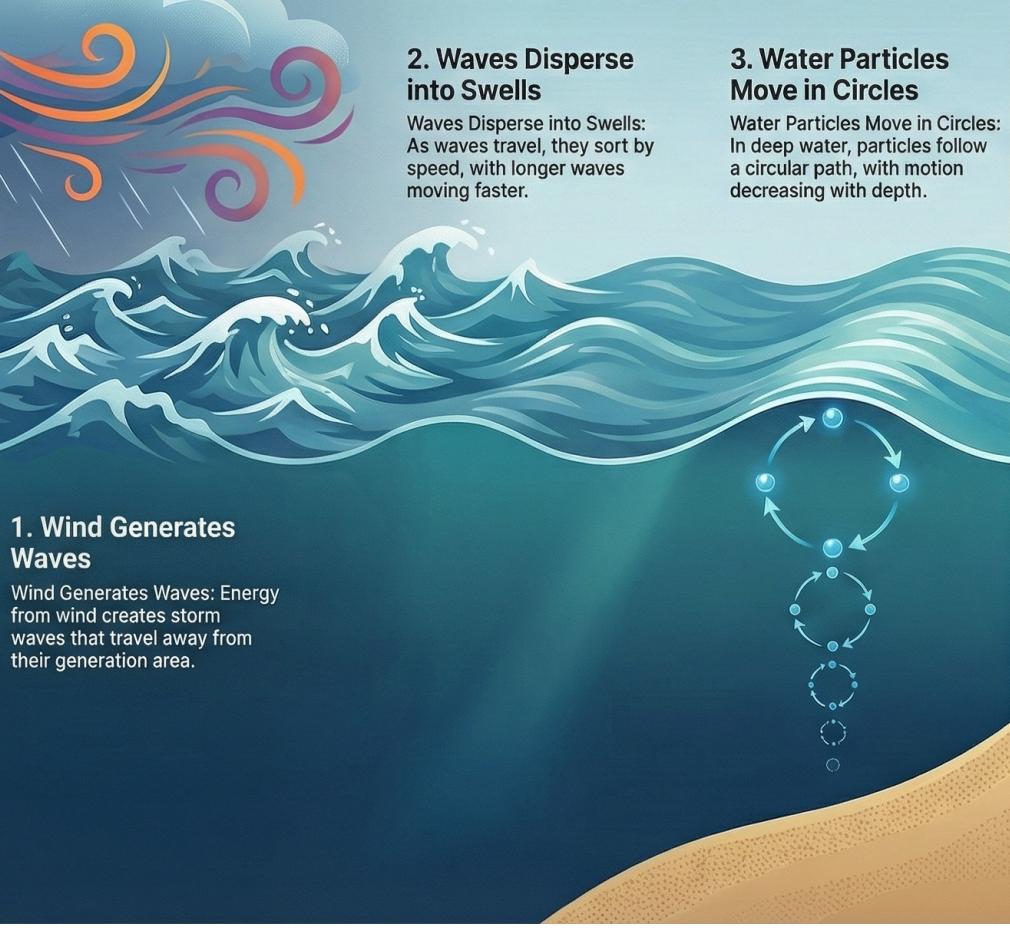
## 1. Wind Wind to Wave (Deep Ocean)

### 2. Waves Disperse into Swells

Waves Disperse into Swells: As waves travel, they sort by speed, with longer waves moving faster.

### 3. Water Particles Move in Circles

Water Particles Move in Circles: In deep water, particles follow a circular path, with motion decreasing with depth.



## 1. Wind Generates Waves

Wind Generates Waves: Energy from wind creates storm waves that travel away from their generation area.

## Coastal Transformation (Approaching Shore)

### Refraction: Waves Bend

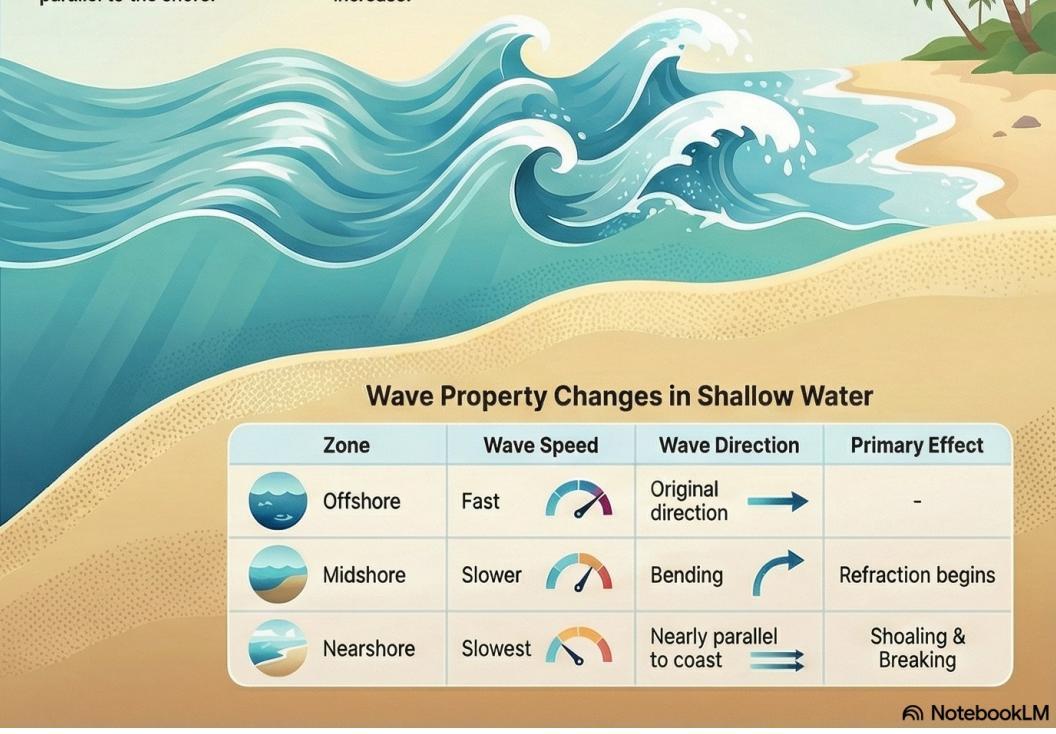
As waves enter shallower water, they slow down and bend to become more parallel to the shore.

### Shoaling: Waves Grow Taller

The wave's energy is compressed into less water, causing wave height to increase.

### Breaking: Energy is Released

The wave becomes too steep and breaks, transferring its energy to the surf zone.



## Wave Property Changes in Shallow Water

Zone	Wave Speed	Wave Direction	Primary Effect
Offshore	Fast		Original direction → -
Midshore	Slower		Bending ↗ Refraction begins
Nearshore	Slowest		Nearly parallel to coast ⇄ Shoaling & Breaking