Geomorphology is the Study of Landforms and the Processes that Create Them, Usually by Erosion, Transportation and Deposition

**Fluvial** = running water, rivers and floodplains

**Glacial** = flowing ice in cold environments, moraine

**Aeolian** = wind, usually in deserts, sand dunes

**Shoreline** = wave action, beach and cliff

**Lacustrine** = lakes are temporary features, peat bog
Rivers Flood in a Perfectly Natural Process. Its Just Inconvenient for People
They Spend Billions $$$ Trying to Control Rivers
The River Floods the Floodplain, the Flat Area on Either Side of the River

So, people build levees to protect the floodplain
In Spite of All the Money Spent, They Still Flood When the Big One Happens.
The Colorado River is One of the Most Manipulated Rivers on Earth, Primarily for Water Supply for Growing Cities and Agricultural Interests of the Southwest.
Aeolian Processes Occur Primarily in Deserts
The Classic Image of a Desert is a Sea of Sand called an Erg as in this Part of the Sahara. On the Left is a Rock Desert called a Reg.
Winds Can Move Tons of Sand Each Day

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The Exact Form of the Sand Dune Is Determined by Type/Amount of Sand and Type of Prevailing Winds.

- **Barchan**
  - Winds prevail from one direction only

- **Transverse**
  - Where winds prevail from one direction only

- **Parabolic**
  - Where sand is anchored by vegetation

- **Barchanoid ridge**
  - Where vegetation anchors sand

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The Star Dune Forms Where the Direction of the Winds Change with the Seasons. It Can Look Like a Starfish on an Air Photo.

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Sand Dunes Have Been Compared to Ocean Waves. Both are Formed by Wind But the Processes are Very Different
Action of Waves Along a Shoreline Can Erode Rock Making a Cliff and Deposit Sand Making a Beach
Coastal Landforms Are Usually Due to a Combination of Local Topography and Wave Action
Lighthouse on headland bluff
Two Types of Glaciers

Continental Glaciers Can Cover Thousands of Square Miles of Land to Depths of Thousands of Feet. The Antarctic Glacier and the Former North American Glacier Are Examples.

The Alpine Glacier is Smaller and Creates the Spectacular Landforms of Some Mountains.

Each Creates Their Own Characteristic Set of Landforms
18 Thousand Years Ago, This Glacier Covered 1/3 of the Continent. Some Depths of Ice Were 2 Miles Thick, Comparable to Antarctica Today.
In the U.S., the Glacier Pushed South to the Ohio River and then Melted, Retreating Northward Leaving Glaciofluvial Landforms Including the Great Lakes
Glacialofluvial landforms Are Still Evident on the Landscape of the Mid-west.
An Alpine Landscape Formed By Water Has a Rounded, Smooth Appearance

(a) Preglacial
Alpine Landscapes formed by Glaciers Has a Sharp Jagged, Craggy Appearance
The Horn is a Classic Feature of Alpine Glaciers
Alpine Glaciers Flow Slowly Down Valleys Until They Melt. They Erode and Transport Tremendous Amounts of Rock and Soil called Till. Often Till Is Deposited at the End of the Glacier as a Terminal Moraine. These Can Be Hundreds of Feet Tall.
Moraines Are Deposits of Rock and Mud Scraped Up and Moved by a Glacier.
Alpine Landscapes Modified by Glacial Action Are Instantly Recognizable. The Horn, U-Shaped Valley and Hanging Valley All Examples.
The U-Shaped Valley with Flat Bottom and Steep Side Walls is a Classic Feature of Alpine Glaciers
Yosemite National Park Is Famous for Its Spectacular Glacial Landforms. The Valley Was Filled with Ice as High as the Cliff.