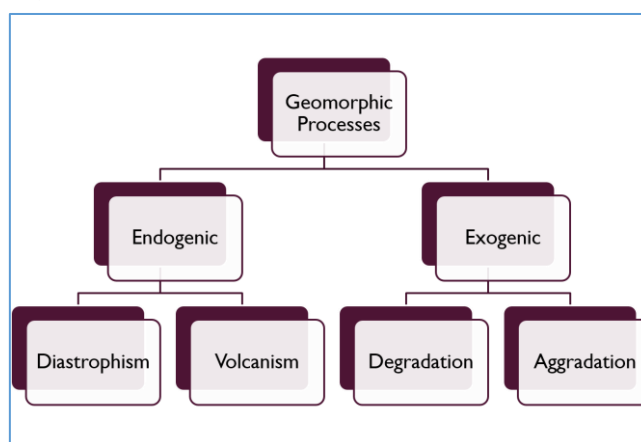


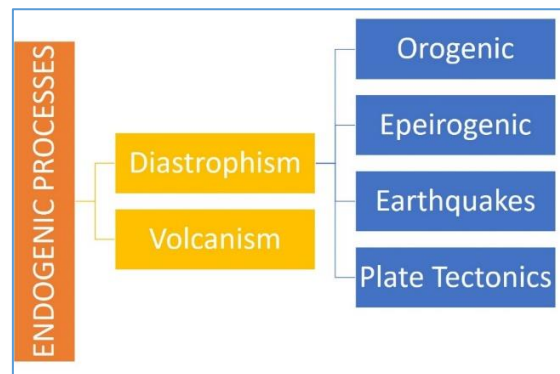
**Key Terms to remember**

- Denudation Process (Exogenic forces): The external forces which result in wearing down (degradation) of relief/elevations and filling up (aggradation) of basins/ depressions, on the earth's surface.
- Diastrophism (Endogenic forces): The internal forces which continuously elevate or build up parts of the earth's surface.
- Geomorphic processes: The endogenic and exogenic forces which cause physical stresses and chemical actions on earth materials and bringing about changes in the configuration of the surface of the earth.
- Any exogenic element of nature (like water, ice, wind, etc.,) capable of acquiring and transporting earth materials can be called a geomorphic agent. Running water, groundwater, glaciers, wind, waves and currents, etc., can be called geomorphic agents.
- Orogenic processes: which involves mountain building through severe folding and affecting long and narrow belts of the earth's crust;
- Epeirogenic processes: which involves uplift or warping of large parts of the earth's crust;
- Force applied per unit area is called stress. Stress is produced in a solid by pushing or pulling. This induces deformation.
- Weathering is defined as mechanical disintegration and chemical decomposition of rocks through the actions of various elements of weather and climate.
- The movement which transfer the mass of rock debris down the slopes under the direct influence of gravity is called Mass Movements.

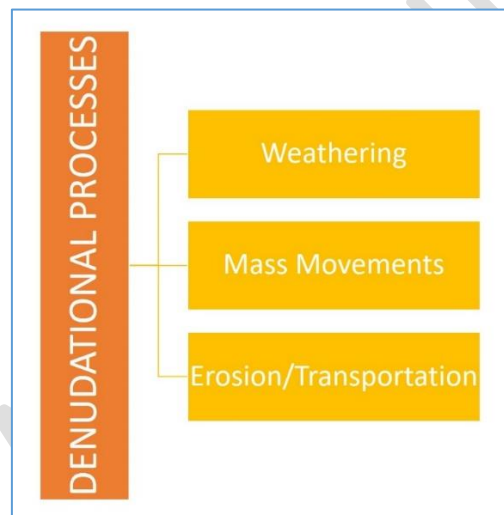
**Why is the surface of the earth uneven?**

- The earth's crust is dynamic.
- There are differences in the external forces originating within the earth's atmosphere and internal forces from within the earth.
- So, variations remain as long as the opposing actions of exogenic and endogenic forces continue.
- Due to differences in the type and structure of earth materials, differences in geomorphic processes and in their rates of operation.

**Geomorphic Processes:**

**Types of Endogenic Processes:****EXOGENIC PROCESSES:**

Types of Exogenic (Denudation) Process:

**What are the forces behind all exogenic processes?**

- The exogenic processes derive their energy from the sun's heat through the atmosphere.
- And also from the gradients created by tectonic factors.
- The basic reason that leads to weathering, mass movements, and erosion is development of stresses in the body of the earth materials.
  - Shear stresses (separating forces) breaks rocks and other earth materials.
  - Molecular stress due to temperature changes, crystallisation and melting also breaks rocks.
  - Chemical processes normally lead to loosening of bonds between grains, dissolving of soluble minerals or cementing materials.

**WEATHERING**

**Types of weathering processes:** - There are three major groups of weathering processes: (i) chemical; (ii) physical or mechanical; (iii) biological weathering processes.

- Chemical Weathering Processes
  - Is a group of weathering processes viz; solution, carbonation, hydration, oxidation and reduction.
  - These act on the rocks through chemical reactions by oxygen, water and other acids.
  - Example: the carbon dioxide presents in the air when mixed with rain water makes carbonic acid which decompose limestone rocks.
- Physical Weathering Processes
  - Physical or mechanical weathering due to stress caused by overburden pressure, expansion forces, water pressures.
  - Most of the physical weathering processes are caused by thermal expansion and pressure release.
- Biological activity and weathering
  - Burrowing and wedging by organisms like earthworms, termites, rodents etc.,
  - Human beings by disturbing vegetation, ploughing and cultivating soils.
  - Plant roots exert a tremendous pressure on the earth materials mechanically breaking them apart.

**Significance of weathering**

- Biomes and bio-diversity is basically a result of forests (vegetation) and forests depend upon the depth of weathering mantles.
- Weathering aids mass wasting, erosion and reduction of relief.
- Weathering of rocks and deposits helps in the enrichment and concentrations of certain valuable ores of iron, manganese, aluminium, copper etc.
- Weathering is an important process in the formation of soils.

**MASS MOVEMENTS**

Heave, flow and slide are the three forms of movements.

- Landslide:
  - These are relatively rapid and noticeable movements. The materials involved are relatively dry.
  - Depending upon the type of movement of materials several types are identified in this category.
    - Slump is slipping of rock debris with a backward rotation
    - Debris slide is without backward rotation.
    - Sliding of individual rock masses down bedding, joint or fault surfaces is rockslide.

**SOIL FORMATION****Process of Soil Formation**

- Soil formation or pedogenesis depends first on weathering.
- First, the weathered material or transported deposits are colonised by bacteria and other inferior plant bodies like mosses and lichens.
- Also, several minor organisms may take shelter.
- The dead remains of organisms and plants help in humus accumulation.
- Minor grasses and ferns may grow; later, bushes and trees will start growing through seeds brought in by birds and wind.
- Plant roots penetrate down, burrowing animals bring up particles, mass of material becomes porous and sponge-like.
- Thus water and passage of air take place in it.
- And finally a mature soil, a complex mixture of mineral and organic products forms.

**Five basic factors control the formation of soils:**

1. **Parent Material:** Parent material is a passive control factor in soil formation. Soil formation depends upon the texture and structure as well as the mineral and chemical composition of the rock.
2. **Topography:** Topography like parent materials is another passive control factor. Soils will be thin on steep slopes and thick over flat upland areas. Soils over flat areas may develop a thick layer of clay with good accumulation of organic matter giving the soil dark colour.
3. **Climate:** Due to rainfall soil gets its moisture which makes the chemical and biological activities possible. Excess of rainfall removes major minerals from the soil.
4. **Biological Activity:** Dead plants provide humus. Due to bacterial growth humus accumulation differ region to region. In cold climates as bacterial growth is slow, layers of peat develop. In humid tropical climates, as bacterial growth is intense, low humus content in the soil.
5. **Time:** A soil becomes mature when all soil-forming processes act for a sufficiently long time developing a profile. Soils developing from recently deposited material are considered young and they exhibit no horizons or only poorly developed horizons.