CHAPTER 1 DENUDATIONAL PROCESSES

Objectives

After studying this chapter, students should be able to:

- describe the concept of denudation.
- identify denudational processes.
- state the factors affecting denudation.

1.1 Denudation and its Phases

The Earth's crust and its forms are not static but undergo modification over a period of time. The pattern of relief over a portion of the earth depends much on the interaction between internal forces and external forces that is in operation. For instance, volcanic eruption builds up topographic features while weathering and erosion break down these features.

The concept **"Denudation"** refers to those external processes that break and wear away the Earth's surface features over a period of time. These processes include weathering, erosion, transportation and deposition. Though these processes are slow and may vary based on location, and the interactive factors, it must be emphasized that they act jointly to produce tremendous impacts on a specific landform.

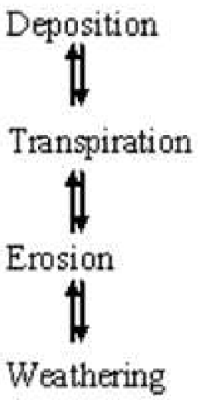


Fig. 1.1: Flow chart of processes of Denudation

1.2 Weathering

This is defined as the breaking down of rocks. It denotes the collective name for a group of processes (chemical or mechanical) that operates at or near the Earth's surface, reducing solid rock materials into a clastic state, especially when exposed to climatic elements and physical attributes. It is a static process and does not involve the seizure and removal of materials by any mobile agency. Weathering also deals with changes that take place at the surface of the Earth in response to water, organic matter and atmospheric variations. It is among the processes responsible for rocks and soil formation.

Erosion

This is the gradual removal of soil or rock particles (weathered materials) by mobile agents such as wind, rainfall, running water, glacier and waves. It is determined by both geologic and anthropogenic factors. Erosion has different stages of development ranging from splash, sheet wash, rills to gully erosion. It has a devastating consequence on landform evolution.

Transportation

This is defined as the movement or the removal of the eroded debris from the initial location to a new location. It includes all the agents of erosion and beyond that directly or indirectly induce the movement of sediments from one area (point of origin) to the other where the materials are deposited (point of Destination). Most weathered or eroded materials are transported from the high land, across the slope to the lowland.

Deposition

Deposition implies the dumping of eroded or weathered materials in a particular region to accumulate over a period of time to form soils or rocks.

1.3 Factors Affecting Denudation

i. **Weather and climate:** Daily change in such weather variables like temperature, rainfall intensity affects the various agents of denudation differently. For example, rock expands and suddenly cracks when the degree of resistance to the prevailing climate or weather is extremely low.

ii. **Rock structure:** The underlying rock structure and mineral composition affect denudational processes differently. For example, basalt which consists of felsper and olivine is more susceptible to chemical weathering than erosion.

iii. **Nature of Relief:** Relief with concave or convex slopes are more easily eroded than uniform, which rather facilitates deposition. Also, weathered materials are easily transported along the convex slope than concave slope.

iv. **Human activities in the area:** The type of human occupation such as agricultural practices, quarrying and mining influences the

denudational phases in different ways. For example, persistent mining on the surface can initiate full development in areas where rainfall is high.

v. **Time:** The duration of time in which a given phase of denudation acts upon rocks or landforms is very important. For instance, the impact created on landforms by erosion, transportation and deposition that has taken place for over twenty years will be more devastating than the one impacted for few years. Therefore, time is a key determinant of changes on surface features.

Summary

- Denudation denotes all the external processes which attack and wear rock outcrops and landforms on or immediately below the Earth's surface.
- Processes of denudation include rock weathering, mass wasting, erosion, transportation and deposition.
- Denudation operates slowly and constantly to subject every landscape features to observable changes in their location.
- Factors affecting denudation include weather and climate, rock structure, nature of relief, human activities, time, etc.

Revision Questions (Objective)

1. The process by which the earth's surface is generally reshaped and lowered is known as

   (A) pediplanation (B) weathering (C) erosion (D) transportation

2. Denudation involves

   (A) reshaping of the earth by agents of transportation (B) reshaping of the earth by agents of deposition (C) reshaping of the earth by

agents of evolution. (D) destruction of earth's surface.

3. Physical weathering is expected to be most active in the
(A) tropical continental region. (B) hot desert region. (C) warm temperate region. (D) arctic region.

4. The correct sequence in the process of denudation is
(A) weathering transportation, erosion, deposition (B) weathering, erosion, deposition, transportation (C) erosion, weathering, transportation, deposition (D) weathering, erosion, transportation, deposition.

5. All the following are processes of physical weathering except alternate
(A) heating and cooling. (B) freezing and thawing. (C) wetting and
drying. (D) oxidation and hydrolysis.

6. Which of the following is not a process of chemical weathering?
(A) Hydrolysis (B) Oxidation (C) Carbonation (D) Most action

7. Weathering, erosion, transportation and deposition are processes of
(A) mass wasting (B) volcanicity (C) denudation (D) exfoliation

8. Human activities as a factor affecting denudation except
(A) agriculture. (B) mining. (C) quarrying. (D) fishing.

9. The following factors affect weathering except
(A) nature of relief. (B)weather and climate. (C) time. (D) wadi.

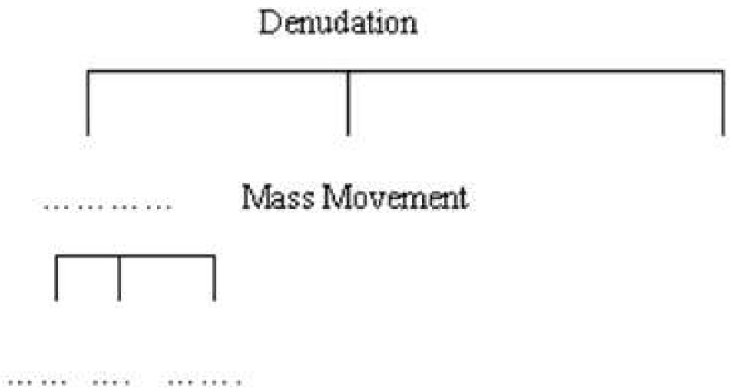
10. The movement in the eroded debris from the initial location to a new location is known as
(A) weathering (B) erosion (C) transportation (D) deposition.

Essay

1. What do you understand by the following terms?

(a) Weathering (b) Denudation (c) Erosion (d) Transportation

2a. Complete the figure below.



(b) Define the terms: (i) Erosion (ii) Transportation

3. Explain how denudational processes aid in reshaping landforms.

4. Write short notes on the following: (i) weathering (ii) Erosion (iii) Transportation (iv) Deposition

5. Explain briefly factors affecting denudation.