


1  **Mass Wasting:
The Work of Gravity**

Earth 9th Edition – Chapter 15

2  **Mass wasting: summary in haiku form**

Mass wasting: downhill
quickly like an avalanche,
or slowly like creep.


3  **Key Concepts**

- "Mass wasting" and its role in landform development.
- Triggers of mass wasting.
- Classification of mass wasting processes.
- Destructive mass wasting: Slumps, rockslides, debris flows and earthflows.
- Less obvious mass wasting: Creep, solifluction and submarine landslides.

4  **Mass wasting & landform development**

- Mass wasting:
 - ☒ the downslope movement of rock, regolith, and soil under the direct influence of gravity
- Role of mass wasting
 - ☒ Geologic process that often follows weathering
 - ☒ Combined effects of mass wasting and running water produce stream valleys

5  **8 Oct 06, Kashmir**

6  **Feb 06, Leyte, P.I.**

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10  **Mass wasting & landform development**

- Slopes change through time
 - ☒ No minimum angle is required for mass wasting to occur
 - ☒ Most rapid and spectacular mass-wasting events occur in areas of rugged, geologically young mountains
 - ☒ Mass wasting and erosional processes slowly lower the land surface

11  **Controls and triggers of mass wasting**

- Important factors include
 - ☒ The role of water
 - Diminishes particle cohesion (friction)
 - Water adds weight
 - ☒ Oversteepening of slopes – slope angle
 - Stable slope angle (angle of repose) is different for various materials
 - Oversteepened slopes are unstable

12  **The effect of water on mass wasting**

13  **Controls and triggers of mass wasting**

- Important factors
 - ☒ Removal of anchoring vegetation
 - ☒ Earthquakes as triggers
 - May cause expensive property damage
 - Can cause liquefaction – water saturated surface materials behave as fluid-like masses that flow

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18 **Controls and triggers of mass wasting**

- Landslides without triggers
 - ☒ Slope materials weaken over time
 - ☒ Random events that are unpredictable

19 **Classification of mass wasting processes**

- ☒ Type of material involved
 - Mud
 - Earth
 - Rock
- ☒ Type of motion
 - Fall (free-falling pieces)
 - Slide (material moves along a surface as a coherent mass)
 - Flow (material moves as a chaotic mixture)
- ☒ The velocity of the movement
 - Fast
 - Slow

20 **Types of mass wasting**

21 **Types of mass wasting**

- Slump
 - ☒ Movement of a mass of rock or unconsolidated material as a unit along a curved surface
 - ☒ Occurs along oversteepened slopes

22 **A slump with an earthflow at the base**

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24 ***La Jolla***

Soledad Mtn. Rd.

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26 ***What's going on this time:
(photos are one hour apart)***

27 ***What's going on:
(photos are one hour apart)***

28 ***What's going on:
(photos are one hour apart)***

29 **Types of mass wasting**

- Rockslide
 - ☒ Blocks of bedrock slide down a slope
 - ☒ Generally very fast and destructive
 - ☒ If it becomes airborne, called avalanche

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31 **Types of mass wasting**

- Debris flow (mudflow)
 - ☒ Consists of soil and regolith with a large amount of water
 - ☒ Often confined to channels

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37 **Types of mass wasting**

- Debris flow

- ☒ Serious hazard in dry areas with heavy rains
- ☒ Debris flows composed mostly of volcanic materials on the flanks of volcanoes are called lahars


38  **A lahar from the 1980 Mt. St. Helens eruption**

39  **Types of mass wasting**

- Earthflow
 - ☒ Form on hillsides in humid regions
 - ☒ Water saturates the soil
 - ☒ Commonly involve materials rich in clay and silt

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41  **An earthflow on a newly formed slope**

42  **Types of mass wasting**

- Slow movements
 - ☒ Creep
 - Gradual movement of soil and regolith downhill
 - Aided by the alternate expansion and contraction of the surface material

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44  **Some visible effects of creep**

45  **Types of mass wasting**

- Slow movements
 - ☒ Solifluction
 - Promoted by a dense clay hardpan or impermeable bedrock layer
 - Common in regions underlain by permafrost
 - Can occur on gentle slopes

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50  **Submarine landslides**

- Submarine landslides are common and widespread in occurrence
- The most spectacular underwater landslides occur on the flanks of submarine volcanoes (called seamounts)

51  **Submarine landslides**

- Large slumps and debris flows scar the continental slopes along the margins of the United States
 - ☒ Triggered by the rapid buildup of unstable sediments, or by forces such as storm waves and earthquakes
 - ☒ Especially active near deltas

52  **End of Chapter**