



IQRA NATIONAL UNIVERSITY

ENGINEERING GEOLOGY

Lecture 03

MASS WASTING/ LANDSLIDE

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What is Mass

Wasting?

Downslope mass movement of rock, regolith, and soil under the influence of gravity (excludes material transported downslope by streams, winds, etc..)



Natural Resources Canada



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Weathering

&

Gravity

What Triggers Mass Wasting?

- Saturated Water
- OverSteepened Slope
- Earthquakes
- Removal of Vegetation
- Removal of support

What are the **Types**
of Mass Wasting?

Fast movements



- Slumps
- Rock & Debris Fall
- Rock & Debris Slides
- Flow

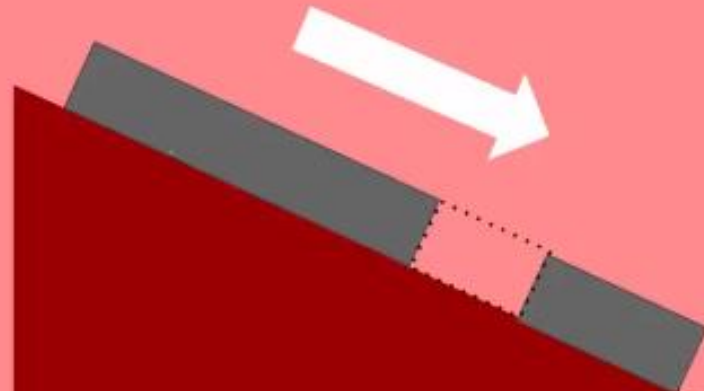
Slow movements



- Creep
- Solifluction
- Permafrost

Rock & Debris Slides

Happens when
rocks or debris
slide down a
preexisting
surface



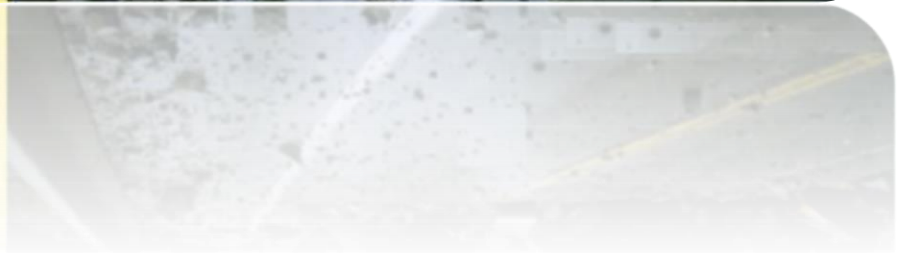
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Rock & Debris Fall

Happens when a piece of rock falls down the slope. Debris falls are similar, except they involve a mixture of soil, regolith, and rocks. At the base there is an accumulation of fallen material termed *talus*



material termed talus
an accumulation of fallen



Slumps

A type of slides wherein downward rotation of rock or regolith occurs along a curved surface due to overstepping



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Flow

Flow of soil and regolith containing a large amount of water

Mameyes mudflow in Ponce, Puerto Rico, caused by heavy rainfall and the mudflow destroyed more than 100 homes and caused 300 casualties



Creep

The gradual downhill movement of soil and regolith



Solifluction

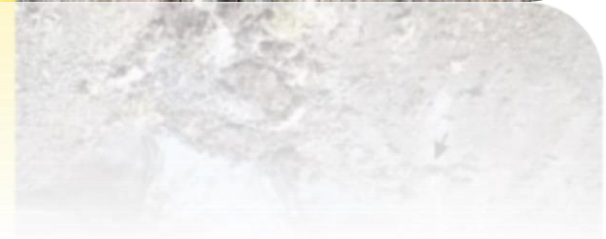
Is flow of saturated soil downslope at a rate of a few millimeters or a few centimeters per day or per year



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Permafrost

Slow landslide due to slowly melting of permanently frozen ground

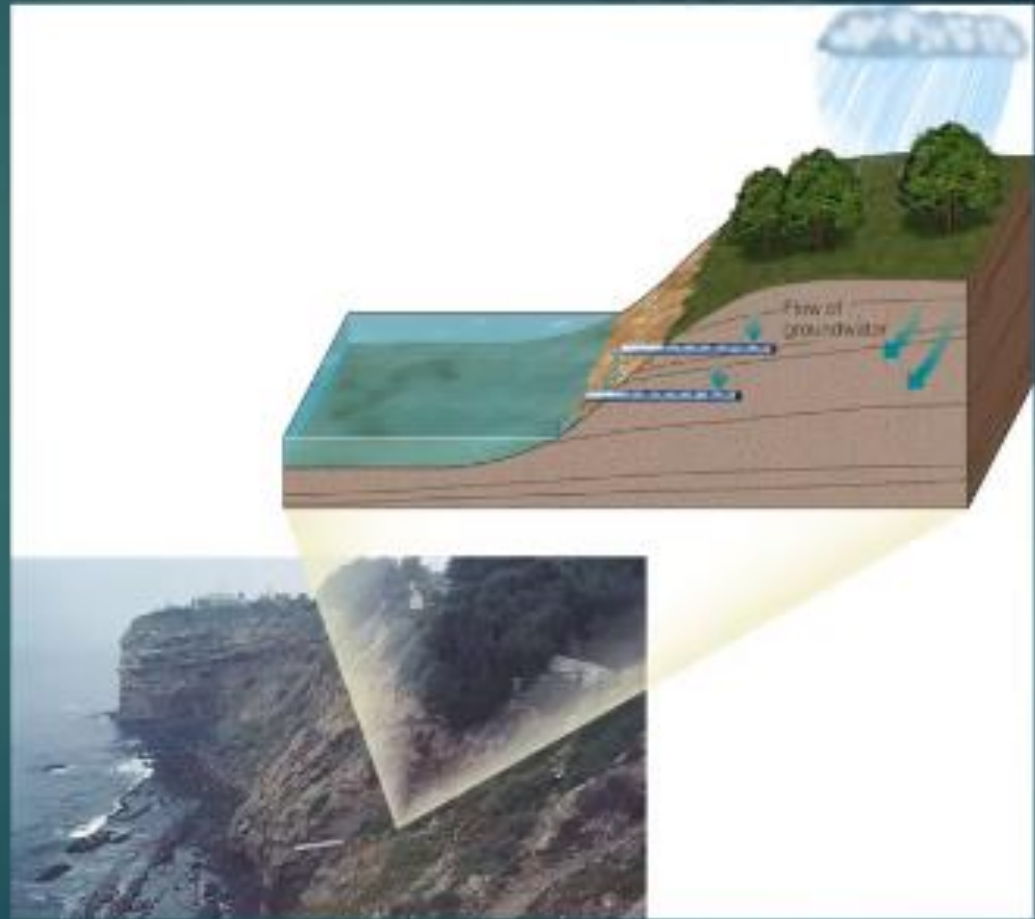


Permafrost

REDUCING RISK OF LANDSLIDE

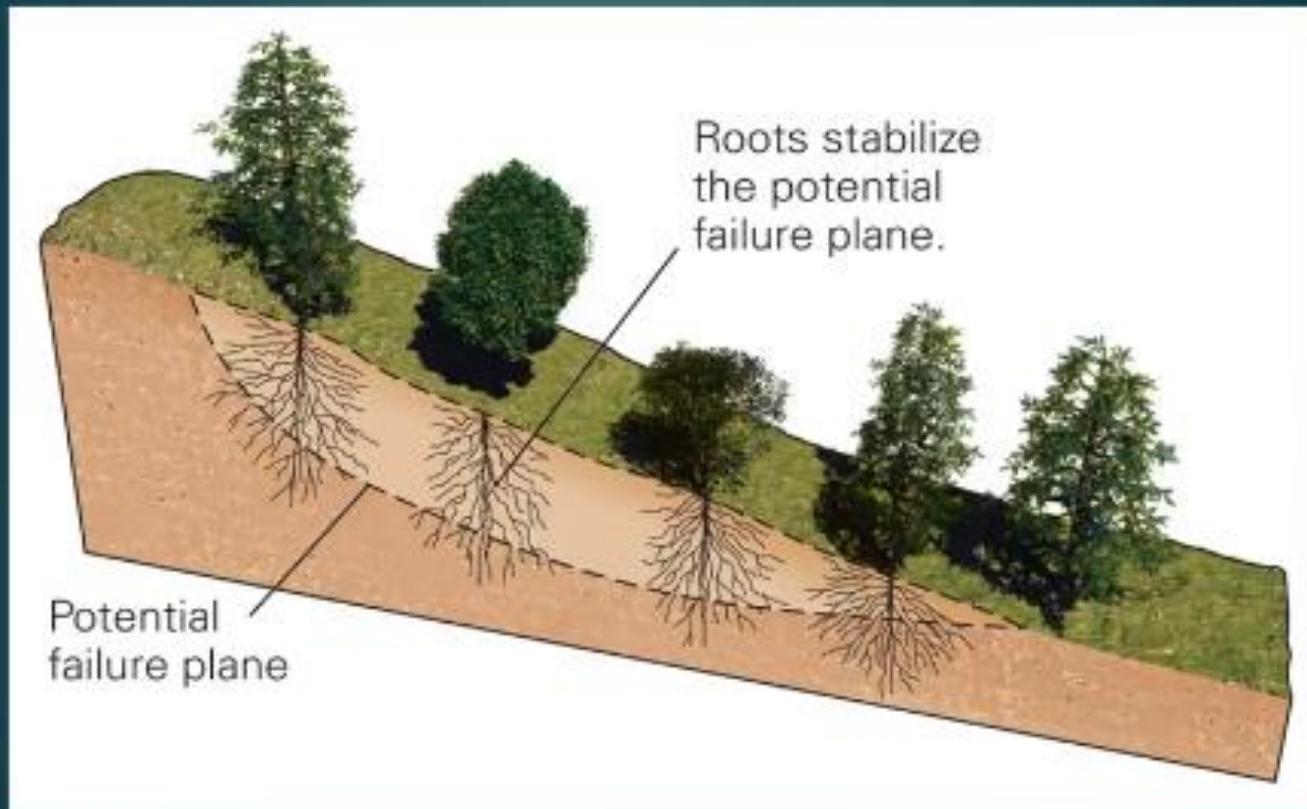
Reducing Landslides

- ▶ Draining water from slopes



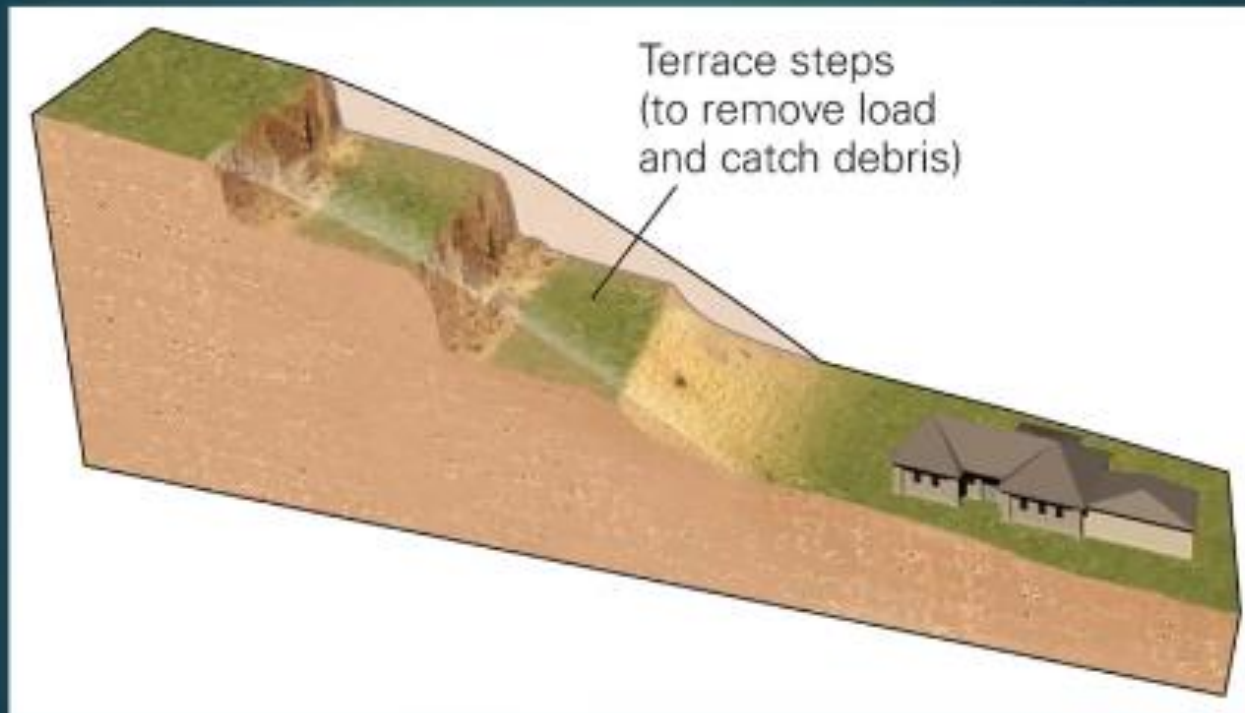
Reducing Landslides

- ▶ Revegetation with plants that have deep roots



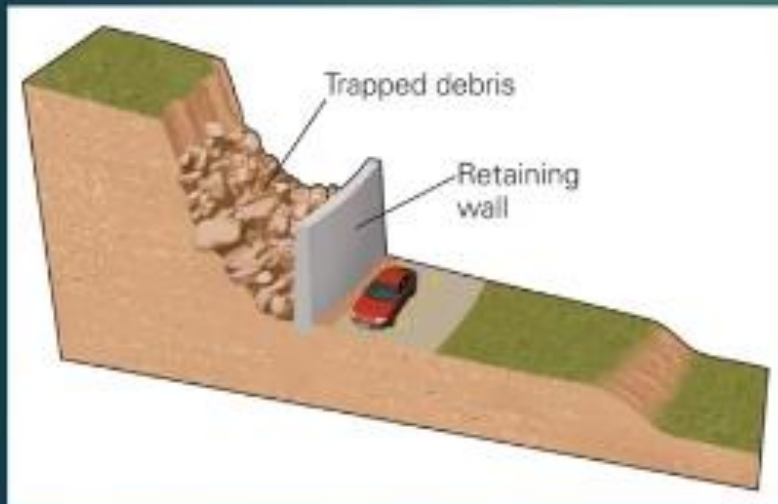
Reducing Landslides

- ▶ Terracing redistributes mass along a slope and reduces the slope angle.



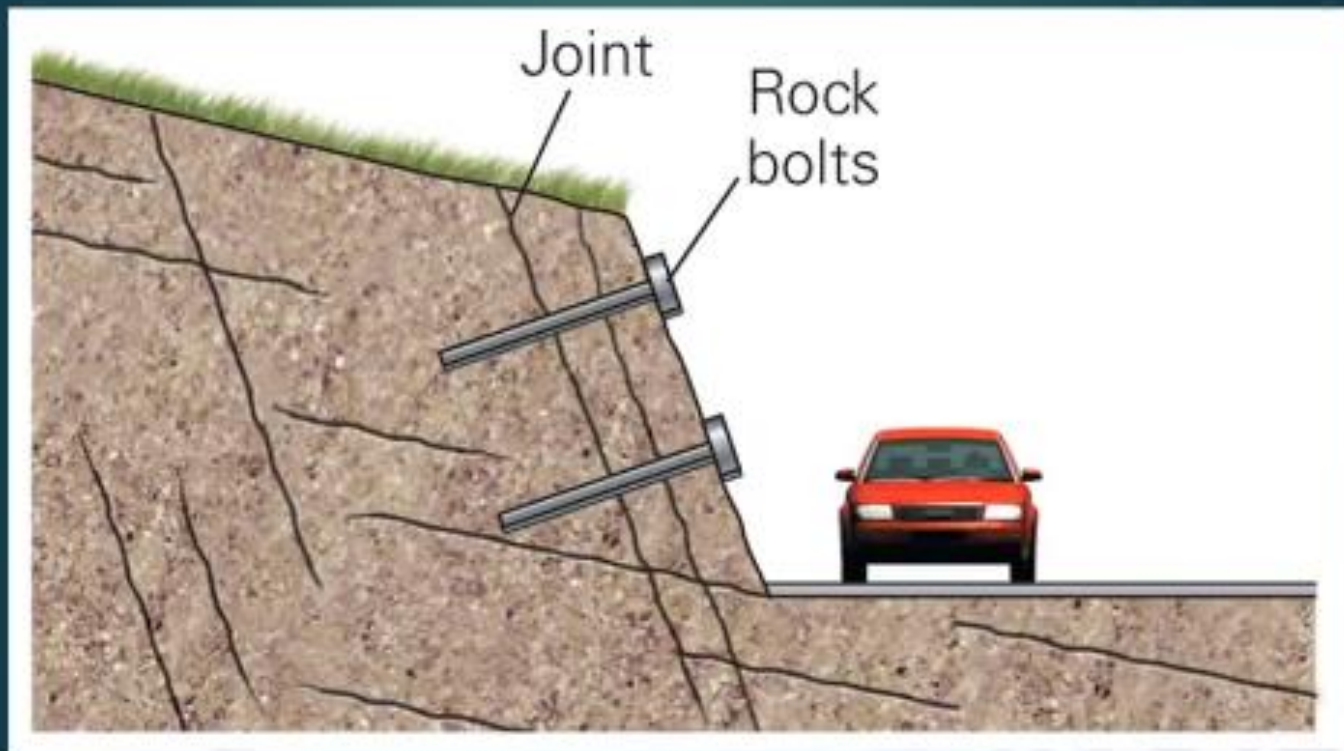
Reducing Landslides

- ▶ Retaining wall can catch debris or stabilize regolith



Reducing Landslides

- ▶ Rock bolts can be used to stabilize coherent masses.



END OF THE LECTURE

