

**Landslides of The Oregon Coast**

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/ *Good*

i. Introduction

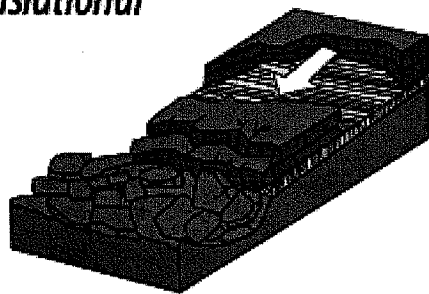
a. Definition of landslide: downslope movement of soil or rock.

i. Modes of Slide

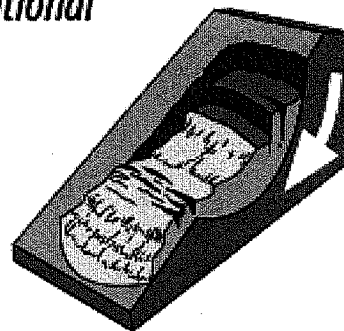
1. translational

2. rotational

*translational*



*rotational*



**Figure 1: translational and rotational slides from "Landslide Hazards in Oregon."**

b. Definition of Flow: mixture of water, soil, rock and/or debris that have become a slurry and commonly move rapidly downslope. Eg. Avalanches and lahars. Types of flow include debris flow, debris avalanche, earthflow, mudflow, and creep.

i. Modes of flow

1. Unchannelized

- a. earthflows are most common type

2. channelized

- a. Commonly starts on a steep slope as a small landslide. It enters a channel and picks up more debris and speed, then deposits in a fan at the outlet of the channel.

- b. Debris flows are sometimes referred to as rapidly moving landslides. These are the most common type of channelized flow. Ex. Lahars are channelized debris flows caused by volcanic eruptions.

- ii. Definition of Falls: abrupt movements of materials such as rocks and boulders.

- iii. Definition of Topples: forward rotation of a unit about some pivotal point under the influence of gravity.

- iv. Definition of Lateral Spreads: extension and subsidence of commonly cohesive materials overlying liquefied layers.

1. commonly triggered by earthquakes, which cause liquefaction of an underlying layer.

2. Usually occur on very gentle slopes near open bodies of water

- ii. Geologic Overview

a. Geology of Landslides

i. Geologic causes

1. weak materials
2. weathered materials
3. sheared, jointed, or fissured materials
4. adversely oriented discontinuity
5. contrast in permeability and/or stiffness of materials

ii. Morphological causes

1. tectonic or volcanic uplift
2. vegetation removal
3. thawing
4. freeze and thaw weathering
5. shrink and swell weathering

iii. Human causes

1. excavation of slope
2. loading of slope
3. drawdown of reservoirs
4. deforestation
5. irrigation
6. mining
7. artificial vibration
8. water leakage from utilities

- iv. Common triggeres: heavy rain, rapid snow melt, earthquakes, grading/removing material from bottom of slope or adding loads to the top of the slope, or concentrating water onto a slope. (eg. From agriculture/landscape irrigation, roof downspouts, or broken water sewer lines)
- v. Generally occur on moderate to steep slopes, especially in weak soil and rock.

b. Historic Landslides on the Oregon Coast

i. The Capes, first noticed in 1997

- 1. Tillamook County near Netarts

ii. HWY 101

- 1. Curry County

iii. The Johnson Creek landslide

- 1. located near Newport
- 2. The landslide has a long history of impacting HWY 101, which passes over the middle section of the slide.

c. Effect of Forest Cover and Forest Clearing on Landslides

- i. Studies have speculated that the greatest increase in landslides occurs after roots have decayed, and before new roots have grown.

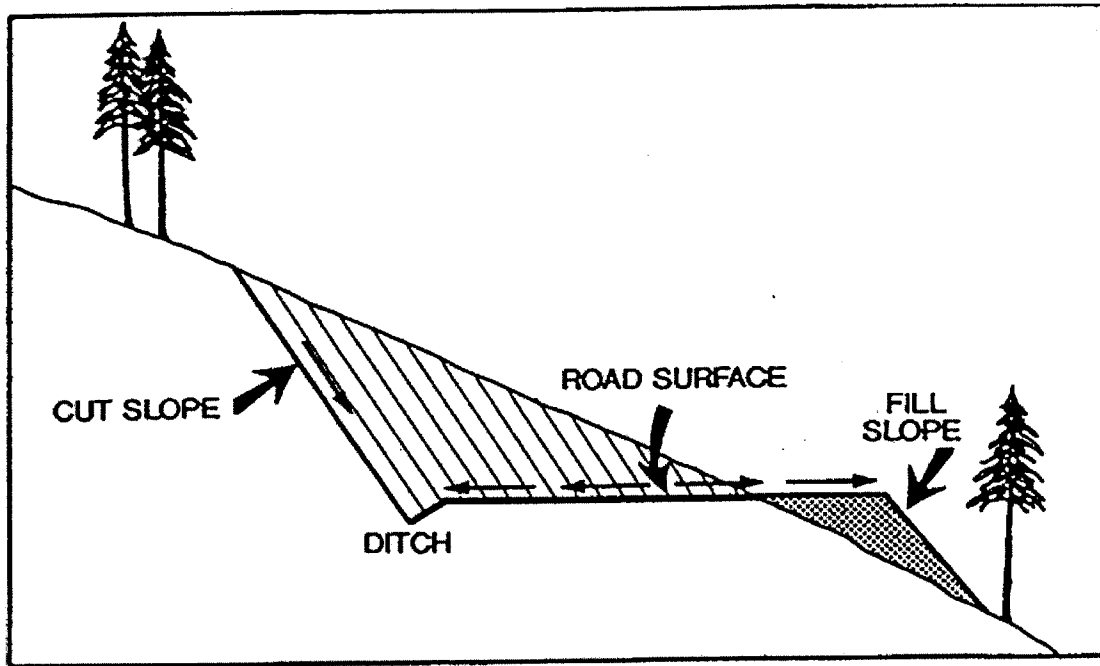
d. Effect of Storms on Landslides

iii. Influence of Landslides

a. Landslide Effects on People

b. Landslides Associated with Roads

- i. Studies have shown that most landslide related impacts on forestlands were related to roads.
- ii. In Robinson's study, 1999, the road associated landslides were about four times larger in volume than landslides that were not associated with roads.



**Figure 2: Road hazards. (Robinson, 1999)**

c. Impact of Landslides on Streams

- i. In Robinson's study, 1999, 32% of the total 145 stream miles surveyed had high impacts due to landslides.
- ii. A large percentage of the highly impacted streams in this study were associated with road associated landslides.

iv. Summary and Conclusion

v. References Cited

- a. Byrne, John V., and William B. North, 1973, Landslides of Oregon: North Coast: Oregon State University Extension Service, Marine Advisory Program.
- b. "Johnson Creek Landslide, Coastal Oregon." Landslide Hazards Program. Web. 03 Mar. 2010.  
<[http://landslides.usgs.gov/monitoring/johnson\\_creek/](http://landslides.usgs.gov/monitoring/johnson_creek/)>.
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- d. Robinson, George, 1999, Oregon Department of Forestry Storm Impacts and Landslides of 1996: Final Report: Oregon Department of Forestry Forest Practices Monitoring Program