



Landslides on Forest Lands

A Position of the Oregon Society of American Foresters

The Oregon Society of American Foresters (OSAF) recognizes that landslides on forest lands represent a complex scientific, land management and public policy issue. Although sometimes harmful to people or property, landslides often reflect natural processes that shape our landscape and can have some ecological benefits. Given such complexities, as well as the adoption of substantial regulations to address concerns about forest practices, OSAF supports:

- 1) reducing landslide damage through expanded efforts that follow the “shared responsibility” concept mandated by the Oregon Legislature (1999 Senate Bill 12), particularly measures that address land use planning, hazard mapping and warnings, and activities other than forestry;***
- 2) continued efforts by professionals with appropriate expertise and experience to interpret both current science and on-site factors to identify measures that effectively reduce landslides and their impacts; and***
- 3) carefully designed monitoring and research to further study landslide occurrence, influences and effects.***

The geology, terrain and climate of the Oregon Coast Range and western Cascades create significant natural landslide hazards, and the occurrence of some landslides can be affected by any land use practice that removes vegetation or adds or removes soil on slopes, including construction of highways, buildings and power lines. Locating homes and other structures downslope of steep, unstable terrain increases public safety risks from rapidly moving landslides. However, most landslide hazards exist whether or not such practices occur and the exact location and timing of slides cannot be accurately predicted. Thus, the identification of hazardous areas for people and property, and ways to reduce their proximity to these areas during times when damaging landslides are most likely, are important policy considerations that require the interpretation of qualified professionals and technical experts. A broad ban on forest management activities on steep slopes would not effectively eliminate existing landslide hazards as there are numerous, natural drivers of slope instability.

Issue

Public awareness and concern about landslides on forest lands in Oregon increases noticeably when large, infrequent storms trigger slides that impact people, structures or natural resources. It is not unusual to hear claims that forest practices caused these landslides, with calls for increased restrictions on such practices. Policy and decision makers will continue to be challenged to address public concerns when the complexity of the problem offers very few simple, fail-safe and economical solutions.

Background

Oregon weather is typically moderate; however, its extremes provide the most pronounced landscape changes. For example, in early 1996, an above average snowpack, torrential rains and very wet soils led to the worst flooding in over 30 years in western Oregon. Another record setting storm occurred in November 1996, resulting in some streams experiencing flood levels that occur only once or twice per century. These storms triggered landslides that caused heavy damage to roads and other structures built within the paths of the landslides. Tragically, 5 people were killed by landslides during the November storm.

A public debate followed, including some who blamed steep-slope clearcutting and road construction for landslide occurrence. In response to public concerns, several agencies evaluated the storm damage and the Oregon legislature passed two bills (1997 Senate Bill 1211 and 1999 Senate Bill 12) that directed changes in forest practice and other regulations. After further studies by the Oregon Department of Forestry and a technical advisory team, the Board of Forestry approved additional rules to reduce landslide problems related to forest roads and timber harvesting. Other major storms that triggered some significant landslides in the Pacific Northwest in 2005, 2007 and 2014 led to renewed interest in the issue of slope stability on forest lands. Such interest can be expected whenever infrequent large storms (e.g., “10-year” or greater events) trigger some significant landslide activity.

Findings and Conclusions

Studies have shown that land management activities, such as timber harvest and road construction, can influence the occurrence and size of landslides in some locations. However, these studies often have used aerial surveys that underestimate the frequency of landslides in unlogged forested areas, as forest cover obscures past landslide features. More reliable ground surveys have shown that landslide frequency in areas harvested within the previous 10 years was about 1.5 to 2 times higher than in forested areas. Other research has suggested that the peak in *shallow* landslide activity following timber harvest tends to occur between 3 and 10 years after harvest, due to loss of forest canopy and decay of existing roots before revegetated roots take hold. However, these findings have been subject to debate as the effects of roots on slope stability is inherently complex with extreme variability in root and soil structure. For example, some surveys of young forests (10 to 100 years) have shown fewer landslides than in older (>100 years) forests. Further, the reinforcing role of roots is likely to become less significant with slope failures that are larger and deeper. Nonetheless, the prompt reforestation required by Oregon law is considered good practice towards reducing shallow slope failures. More research towards characterizing the temporal and spatial influence of roots on slope stability is needed.

Forest roads generally have been more important than timber harvest as a management influence related to destructive landslides. However, over the past three decades, key changes in road design, location and maintenance have been made to reduce such landslides, including fewer mid-slope roads and improved water management. In addition, advanced timber harvest systems can reduce the need for logging roads. Both research and considerable field experience indicate that such improvements have significantly reduced landslide impacts. Continued emphasis on forest roads is needed, especially older roads that may need to be upgraded to current standards or decommissioned.

Landslides reflect natural processes that have helped shape the current landscape of the Pacific Northwest. These processes may have some positive ecological benefits, such as renewal of supplies of large woody debris and gravels that are necessary for healthy aquatic systems as well as natural redistribution of mineral soils. In particular, the Oregon Coast Range and western Cascades have areas where geology, steep terrain, and high rainfall naturally combine to favor landslide processes and have done so for many thousands of years. Even within these areas, however, landslide characteristics vary greatly among specific locations, and thus only a small portion of the landscape carries a significant risk of slide occurrence at any point in time.

When damaging landslides occur on forest lands it is not unusual to hear appeals for a broad ban on timber harvest and road construction on steep slopes. However, such a ban would be very costly to many forest landowners and impact their contributions to state and local economies. Moreover, such a ban may reduce some landslides in the near term but not eliminate their occurrence over longer periods, as many naturally unstable landforms often are only marginally stable even without human disturbances.

While much is known about landslides, it remains very challenging to accurately predict where and when landslides will occur. Although climate change adds some complexity, inventorying past landslides shows promise for identifying potentially unstable landforms and understanding the characteristics of at-risk terrain. This approach is aided by newer remote sensing technologies such as lidar, which enables identification of past landslide deposits underneath the forest canopy. Additional knowledge attained from site-specific, carefully designed monitoring and research programs will improve our ability to predict landslides and their impacts and to apply this knowledge effectively to policy and land management decisions. However, homes and other structures still exist in hazardous locations and some continue to be built or sold without recognizing or disclosing such hazards. Such situations can trigger restrictions on forest management upslope, but this step alone does not necessarily improve public safety.

Landslides will continue to occur in Oregon. It remains vital to increase and apply our expanding knowledge and experience to reduce human influences on landslide occurrence and their negative impacts. This includes educating policy makers and the public about the wide nature and complexity of landslide and land use issues, and well-informed decisions that reflect the full scope of “shared responsibility” (Senate Bill 12) needed to effectively reduce landslide risks.

Selected References

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This position statement was adopted by the OSAF Executive Committee on October 4, 2019. The statement will expire on October 4, 2024 unless after thorough review it is renewed by the Committee.