

Assessment of the Impacts of Climate and Land Cover Change on Landslide Susceptibility

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The Olympic Experimental State Forest is a commercial forest lying between the Pacific coast and the Olympic Mountains. As this area is critical habitat for numerous organisms, including salmon, there is a need to investigate potential management plans to promote the economic viability of timber extraction while protecting the natural habitat, particularly in riparian areas. The western Olympic Peninsula is an area of very steep slopes and high rainfall. As clear-cutting reduces the strength of the soil, and as projected climate change may result in storms with higher intensity precipitation, this area may become more susceptible to landslide activity. This may result in potentially severe consequences to riparian habitat due to increased sediment loads. Therefore, research should be performed to quantify the impacts of land cover and climate changes on slope stability. This research can be used to provide a tool that forest managers can use for long-term planning to protect riparian habitat while not harming the timber industry.

The overarching goal of this study is to determine the long-term effects of forest management decisions and climate change on slope stability. The objective of this study is to establish a method which can be used for landslide risk mapping for management purposes in mountainous forests. We hypothesize that soil moisture will be a key indication of slope instability. A physically-based hydrology model, the Distributed Hydrology Soil Vegetation Model, will be applied to (1) simulate soil moisture conditions for historic rainfall and landslide events to explore the role of soil moisture on landslide probability and (2) develop maps of landslide susceptibility for various climate and forest management scenarios. Results will include an understanding of the mechanisms triggering landslide events in the Olympic Peninsula, an assessment of how future climate conditions and alternate management practices may impact landslide susceptibility over this area, and a methodology that can be used by forest managers as a tool to make long-term planning decisions.

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Muhammad Barik received his Bachelor's degree in Civil Engineering from the Bangladesh University of Engineering and Technology in 2007. After graduation he joined the Institute of Water Modeling and served there for almost one year as a junior engineer. At present, he is an M.S. student in the Department of Civil and Environmental Engineering at Washington State University. His research focuses on assessing climate and land cover change impacts on landslides.