

# Landslides

*Processes, Prediction, and Land Use*



Roy C. Sidle and Hirotaka Ochiai

# LANDSLIDES

## Processes, Prediction, and Land Use

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# Table of Contents

<b>Preface .....</b>	<b>vii</b>
<b>1. Introduction and Overview of Landslide Problems .....</b>	<b>1</b>
• Overall Significance of Landslides .....	2
• Distribution of Landslide Hazards Worldwide .....	9
• Loss of Human Life .....	10
• Economic Consequences .....	13
◦ Direct Costs .....	14
◦ Indirect Costs .....	15
• Examples of Detailed Economic Analyses of Landslide Damages .....	15
◦ Widespread Landslide Damage From Forest Conversion, New Zealand .....	16
◦ The Costly Thistle Landslide, Central Utah (USA) .....	17
◦ Landslide Damage From the February 2001 Nisqually, Washington (USA), Earthquake .....	18
◦ Damage from the 1998 Malpa Landslide, Kumaun Himalaya, India .....	19
• Other Environmental Impacts .....	20
<b>2. Characteristics of Various Types of Landslides .....</b>	<b>23</b>
• Classification Systems .....	23
• Broad Functional Categorization of Mass Wasting Processes .....	24
◦ Shallow, Rapid Landslides .....	26
◦ Rapid, Deep Slides and Flows .....	29
◦ Slower, Deep-Seated Landslides .....	32
◦ Slow Flows and Deformation .....	36
◦ Surficial Mass Wasting .....	38
<b>3. Natural Factors Influencing Landslides .....</b>	<b>41</b>
• Geological Factors .....	41
◦ Rock Characteristics and Weathering .....	41
◦ Bedrock Structure .....	44
◦ Unstable Bedding Sequences .....	45
◦ Tectonics .....	47
• Soil Engineering, Chemical, and Mineralogical Factors .....	49
◦ Engineering Properties of Soils .....	49
◦ Chemical and Mineralogical Properties .....	51
• Geomorphic Factors .....	55
◦ Slope Gradient .....	55
◦ Slope Shape .....	58
◦ Aspect and Altitude .....	63
◦ Relative Importance of Slope Gradient Versus Soil Thickness .....	64
◦ Landslide–Debris Flow Linkages .....	65
• Hydrologic Factors .....	67
◦ Precipitation .....	68
◦ Hydrological Properties of Soils and Weathered Bedrock .....	70

○ Infiltration .....	74
○ Subsurface Flow Processes .....	76
○ Pore Water Pressure Generation and Slope Stability .....	80
○ Examples of Groundwater Response .....	82
□ Shallow soils .....	82
□ Deep soils .....	87
○ Vegetation Influences .....	89
○ Evapotranspiration .....	90
○ Root Strength .....	94
□ Measurement of root strength .....	95
□ Models of mechanical reinforcement of soils by vegetation roots .....	98
□ Examples of root strength for various vegetation types .....	102
□ Root strength dynamics .....	104
○ Relationship Between Vegetation and Slope Stability .....	107
□ Influence of roots on slope stability .....	108
□ Tree surcharge and wind .....	109
• Seismicity .....	110
○ Characteristics and Examples of Damages Caused by Earthquake-Triggered Landslides .....	110
○ Effect of Ground Motion on Landslide Occurrence, Size, and Type .....	112
○ Topographic Factors Affecting Landslide Occurrence During Earthquakes .....	113
○ Geologic Factors Influencing Landslide Occurrence During Earthquakes .....	115
○ Pore Water Pressure .....	116
○ Using the Seismic Coefficient in Stability Analysis .....	117
• Volcanic Activity .....	117
○ Causes and Types of Landslides .....	117
○ Recent Examples .....	119
<b>4. Landslide Analysis .....</b>	<b>121</b>
• Analysis of Stresses Within Slopes and Initiation Mechanisms of Landslides .....	121
• Quantifying Landslide Trigger Mechanisms .....	124
○ Rise in Groundwater Level and Pore Water Pressure .....	124
○ Increase in Slope Inclination .....	126
○ Increase in Weight .....	126
○ Earthquake Loading .....	127
○ Effects of Vegetation .....	128
• Primary Causes of Landslides .....	129
○ Geomorphic Factors .....	130
○ Geotechnical Properties of Soil Materials .....	130
□ Peak strength during shear, residual strength, and creep .....	130
□ Fluidization processes in landslides .....	131
□ Strength properties of unsaturated soil .....	132

○ Hydrological Properties of Slope Materials.....	133
• Problems in Applying Theoretical Stability Analysis to Natural Hillslopes .....	134
<b>5. Hazard Assessment and Prediction Methods .....</b>	<b>139</b>
• Overview of Techniques and Methodologies .....	139
• Terrain Hazard Mapping.....	139
○ Western Oregon Forest Practices Example .....	140
○ British Columbia Terrain Hazard Assessment Example .....	141
○ Raukumara Peninsula, North Island, New Zealand, Example.....	143
○ Other Examples.....	143
○ Recent Technology .....	144
• Simple Rainfall–Landslide and Earthquake–Landslide Relationships .....	145
○ Rainfall Characteristics .....	145
○ Earthquake Characteristics.....	148
• Multi-Factor, Empirical Landslide Hazard Assessment .....	150
○ General Characteristics and Types .....	150
○ Examples of Multi-Factor Assessment .....	152
○ Future Challenges .....	154
• Distributed, Physically Based Models.....	155
○ The SHALSTAB Model.....	156
○ The dSLAM and IDSSM Models .....	157
○ Other Physically Based Distributed Landslide Models .....	159
• Overview of Landslide Hazard Assessment and Prediction Methods .....	160
<b>6. Land Use and Global Change .....</b>	<b>163</b>
• Timber Harvesting .....	163
○ Silvicultural Practices .....	164
○ Logging Methods .....	173
○ Effects on Stream Systems and Long-Term Catchment Processes.....	174
○ Control and Avoidance Techniques.....	176
○ Unstable Slope Indicators .....	179
□ Terrain indicators .....	179
□ Soil and geological indicators.....	180
□ Wet site indicators.....	181
□ Other vegetative indicators .....	181
• Roads and Other Transportation Corridors.....	183
○ Highways and Railways.....	185
○ Low-Volume Roads and Trails.....	188
○ Avoidance Measures .....	193
□ Road location .....	193
□ Alternative construction techniques.....	196
□ Road drainage .....	198
□ Road maintenance.....	200
□ Warning systems .....	200
○ Structural Control Measures .....	201

• Conversion of Forests to Agricultural Lands and Plantations.....	203
◦ Management Effects .....	203
◦ Control and Avoidance Practices Amidst the Politics.....	206
• Steepland Grazing and Grasslands.....	209
◦ Management Effects .....	209
◦ Avoidance and Control Practices .....	211
• Fire .....	213
◦ Management Effects .....	213
◦ Avoidance and Control Practices .....	216
• Urban, Residential, and Industrial Development .....	217
◦ Background and Vulnerability .....	217
◦ Direct Effects .....	219
◦ Avoidance and Mitigation Measures.....	223
◻ Urban planning and regulation.....	224
◻ Control and mitigation measures .....	229
• Mining .....	230
• Tourism and Recreation.....	235
• Global Climate Change .....	236
<b>7. Summary .....</b>	<b>239</b>
<b>Notation.....</b>	<b>243</b>
<b>References .....</b>	<b>247</b>
<b>Index.....</b>	<b>307</b>

## Preface

This book marks the culmination of 5 years of writing as well as the cumulative experience gained from working in various regions of North America, New Zealand, Southeast Asia, Japan, Europe, and China over the past 30 years. About 20 years ago I wrote the Water Resources Monograph *Hillslope Stability and Land Use* for American Geophysical Union with two colleagues from New Zealand. Whilst still relevant to the issues of land management and landslides, it is obvious that many advances have been made related to landslide process understanding, prediction methods, and management implications; thus, a totally new book was warranted on this topic. This time I have included as co-author my very good friend Dr. Hirotaka Ochiai, who not only wrote most of Chapter 4 and much of the “Seismicity” section of Chapter 3, but also introduced me to the incredible breadth of research and management activity related to landslides in Japan and was very influential in my eventual placement as Professor at Disaster Prevention Research Institute (DPRI), Kyoto University. Dr. Ochiai is one of the leading members of the Japanese landslide community, not only as a researcher, but also as a liaison with management agencies and a mentor for young scientists. He opened doors for me that most foreign scientists will never experience or appreciate, and for this I am forever indebted to him. Much of the knowledge that I gained from working in Japan is imbedded in this book.

As the title implies, the book focuses on landslide processes, prediction methods, and effects of land use. It is meant to serve as a benchmark reference for researchers, engineers, land managers, educators, planners, and policy makers dealing with landslide issues, and would be appropriate as a university textbook for an upper division or graduate-level course. The timeliness of the text is underscored by the recent landslide tragedy in southern Leyte Island in the Philippines which killed an estimated 1800 people. Both the detailed descriptions of landslide processes (Chapter 3) and the effects of land use on landslides (Chapter 6) could stand alone as significant parts of university courses. The text has been written in one “voice” rather than a compilation of chapters by individuals. These points represent the forte and uniqueness of this book amongst other texts that have focused on engineering aspects of landslides and correction measures, as well as collections of process-based studies or case investigations. Throughout the book, the terms *landslide*, *mass wasting*, and *soil mass movement* are used largely synonymously. Strictly speaking, the processes of soil creep and dry ravel would not

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be considered landslides but can be classified as soil mass movements or mass wasting processes. The term *slope stability* is used to refer to all types of potential soil mass movement processes that occur on hillslopes. While I have tried to be as geographically inclusive as possible, the contents are necessarily biased towards areas in which I have actively worked. Of the approximately 1300 references included herein, refereed scientific journal papers were cited where possible. Nevertheless, due to the nature of certain examples and management implications, it was necessary to cite a wide array of symposium proceedings, agency reports, and other non-refereed materials. Because of the numerous citations, portions of long reference strings in the text have been placed in footnotes at the bottom of respective pages to improve readability.

The writing of this book has been influenced by a career of collaborations and discussions with colleagues from around the world, far too numerous to mention here, but greatly valued. In reflecting on such discourses, it is often through points of difference and disagreement where the most notable achievements have been made. The opinions expressed in the book, particularly related to agency policies, are mine; where these are critical, I do so in the hope of implementing new discussions on these topics that will benefit our environment. To remain totally uncommitted and unbiased, I accepted no support from any environmental groups, industries, international organizations, special interest programs or any other institutes related to the writing of this book. I thank my employer, Kyoto University, DPRI, for allowing me the time and total freedom to write the bulk of this text. Many people at DPRI contributed useful references to the book. I am grateful to Toshitaka Kamai, Robert Olshansky, Aurelian Trandafir, Takashi Gomi, and Tewodros Ayele Taddese for reviewing portions of the manuscript and giving me valuable suggestions. Special appreciation is extended to Dr. Walt Megahan and Professor Nelson Fernandes for reviewing the entire text and providing insightful comments. Finally, I wish to thank Dr. Karin Laursen for exemplary work and patience in preparing the references and figures as well as providing useful advice on clay mineralogy and petrology related to landslides.

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