A simple definition of a landslide

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A SIMPLE DEFINITION OF A LANDSLIDE

UNE DÉFINITION SIMPLE D'UN GLISSEMENT DE TERRRAIN

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Summary

A landslide is the movement of a mass of rock, earth or debris down a slope.

Résumé

Un glissement de terrain est la descente d'une masse de roche, de terre ou de débris le long d'un versant.

Introduction

One obstacle to a simple definition of "landslide" is the erroneous assumption that a landslide is, simply, a slide of land. A similar linguistic analysis would suggest that a cowboy is a male calf. The less formal analysis here starts with a review of the history of the term. With this background, some current definitions can be rephrased in the terminology of the Working Party on World Landslide Inventory (1990) to give the simple, easily-understood definition which forms the Summary. The definition is intended for informal, non-technical use.

History

Cowboys and Landslides are both North American words. The Oxford English Dictionary (Onions, 1933) suggested that "landslide" was a U.S. (United States of America) usage equivalent to the English word "landslip". While the Dictionary was published in 1933, the letter "L" had been compiled by 1902 and reflected the English language at the turn of the century. The Dictionary defined a landslip as "the sliding down of a mass of land on a mountain or a cliffside; land which has so fallen". Contemporary English studies of scenery (Lubbock 1902, Marr 1916) mentioned "landslips" without mentioning "landslides". The Dorset coastal landslips noted by Lubbock (1902, p. 223) continued and have been described by Arber (1941, 1973), Conway (1975), Denness et al. (1975) and Brunsden and Jones (1972, 1976). Only the last authors called these slope movements "landslides".

In North America, at the century's turn, the well known description of "The great landslide at Frank" by McConnell and Brock (1904) quoted only the German language literature for terminology. What is now classified as a rock fall-debris flow or possibly a rock slide-debris flow (Van Gassen and Cruden, 1989), was termed a rock avalanche (p. 1), a landslip (p. 11), a land slide (p. 12), and a rock slide (p. 16), indicating the range of the terminology of slope movements then available.

"Landslip" had been introduced to the technical literature by Lyell (though the Oxford English Dictionary noted a popular use of the term in 1678). Rudwick (1970) claimed that "Charles Lyell's Principles of Geology should be numbered among the most revolutionary books in the history of science... the Principles enjoyed immediate success among the educated reading public, and eleven successive editions were called for up to the end of Lyell's life...". The first edition was in three volumes, Volume 1 was published in 1830, Volume 2 in 1832 and Volume 3 in 1833. Second editions of Volume 1 and 2 published in 1832 and 1833 appeared before the first edition of Volume 3 (Rudwick, 1970). The glossary of Lyell's work (1833) gave landslip as "A portion of land that has slid down in consequence of disturbance by an earthquake or from being undermined by water washing away the lower beds which supported it". This narrow definnition reflected

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Lyell's limited experience of slope movements. The examples of landslips noted in the index are, again, from the south and east coasts of England, the Calabrian earthquake of 1783 and the Jamaican earthquake of 1692. "Landslide" is not included in the Glossary or the index of the three volumes.

Lyell did use "slide" at least twice. In Volume 2, chapter 14 under a heading "Imbedding of organic remains in alluvium and the ruins caused by landslips", Lyell mentioned the Goldau rock slide-debris flow, "The number of lives lost by the slide of the Rossberg, in Switzerland, in 1806, was estimated at more than eight hundred, a great number of bodies being buried under mud and rock, at great depths, as well as several villages and scattered houses". No reference was given, so presumably, Lyell had visited the slide on his way to Italy.

In Volume 1, pp. 192-193, Lyell described movements on the slopes of the White Mountains of New Hampshire caused by the heavy rains of 28th August, 1826. Under a heading of "Floods, Bursting of Lakes", there is a paraphrase of Silliman, B., Wilcox, C., Baldwin (1829, p. 220). "The avalanches were very numerous; they were not however ruptures of the main foundation rock of the mountain but slides from very steep declivities beginning in many instances at the very top of the mountain and carrying down in one promiscuous and frightful rain, forests and shrubs and the earth that sustained them; stones and rocks innumerable and many of great size such as would fill a common apartment, the slide took everything with it down to the solid mountain rock and being produced by torrents of water, which appeared to have burst like water spouts upon the mountains".

The slope movements in the White Mountains attracted the interest of C.F.S. Sharpe (1938, p.ix) "Bare scars down steep mountain slopes are conspicuous features in that part of New England and the destructive Willey slide of 1826 is well remembered in local folklore". Sharpe (1938, p. 61) classified the movements as debris avalanches commenting "Were there a smaller water content the same material would move as a debris slide... initial movement and progress on the steep upper part of the course is caused by slippage, sometimes on a smooth underlying rock surface and sometimes within loose debris. Recorded slopes range from about twenty to forty degrees near the head but flatten out to fifteen degrees or less toward the terminus where the accumulated momentum and a high water content cause the mass to flow forward in a manner similar to a typical mud-flow".

These extensive quotations show that the slides were outside Lyell's definition of landslip and the slides at Goldau and in the White Mountains both flowed. Silliman et al. (1829) used "slide" in the sense of the gliding or flowing of a stream, a sense noted by the Oxford English Dictionary as "now rare". However the Dictionary gave without comment a meaning for the verb as "pass from one place or point to another with a smooth and continuous movement, especially through the air, water or along a surface". The first use of "landslide" was in Niles' National Register for 6 october, 1838, which reported, under the heading "Land slide in Vicksburg", "An avalanche or sinking of the earth on the margin of the landing at Vicksburg" (Craigie and Hulbert, 1942).

Landsliding has spread to subaqueous and submarine slope movements (Terzaghi, 1956). This extension, of course, fell within Terzaghi's defintion of a landslide (Terzaghi, 1950).. rapid displacement of a mass of rock, residual soil or sediments adjoining a slope in which the centre of gravity of the moving mass advances in a downward and outward direction". Again, "Recently collected evidence shows that some of the world's largest landslides have occurred on the steep, submerged volcanic slopes of the Hawaiian Islands" (Lee, 1989, p. 373).

Landslides, then, are not confined to the land or to sliding in the modern sense of the term. Like "cowboy", "landslide" is another North American word formed by two words which together mean something entirely different.

Some definitions

The Glossary of Geology (Bates and Jackson, 1987) defined a landslide as "...the downslope transport under gravitational influence of soil and rock material en masse. Usually the displaced material moves over a relatively confined zone or surface of shear". This definition can be simplified by removing the qualifying sentence and translating all of what remains into less pretentious English.

Webster's 3rd International Dictionary took this approach to give "The usually rapid down slope movement of a mass of rock, earth or artificial fill on a slope" If, again, qualifications of the central idea can be removed and we use the terminology of the Working Party on World Landslide Inventory (1990), a landslide is" The movement of a mass of rock, earth or debris down a slope". This is the informal definition recently adopted by the Working Party and suggested for use in the International Decade for Natural Disaster Reduction (1990-2000).

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