Summary

There is huge amount of literature available on landslides. This because landslides is a classical problem that researchers and practising geologists and engineers have dealt with for a long time all over the world.

This report contains a selection of reference material which is assumed to be useful for SNET in their future work. It includes a compilation of papers on landslides prepared by NGI’s staff, an overview of landslide literature in the NGI library in Oslo, a summary of references to articles on rainfall as a trigger for landslides, including material on lahars, relevant web sites and a list of what is considered as classical textbooks on landslides.

A CD with a selection of NGI landslide related papers in full text is attached to the report.
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Attachment CD with a selection of NGI publications in full text

Review and reference document
1 INTRODUCTION

In El Salvador, landslides are typically triggered during heavy rainstorms, either in connection with hurricanes or with local rainshowers originated during the afternoon in the rainy season. Earthquake is another trigger as well as special lahars in connection with outburst from a volcano.

The project has been sponsored by the Norwegian Ministry of Foreign Affairs with the aim of strengthening the competence within the field of landslides at SNET. This institute, acting as the national centre of competence in natural hazards, is an important actor in reducing the risk for new disasters by implementation of preventive measures.

The ongoing institutional cooperation program between SNET and NGI consists of the following elements:

- Mapping of the rockfall/debris flow hazard in the slopes of the San Vicente Volcano
- Real time monitoring of the landslide hazards and implementation of an early warning system
- Case studies of landslide as training for SNET’s staff
- Improvements in the building codes accounting for the rather high landslide risk.
Appendix A - NGI Publications on Landslides

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A1 NGI PUBLICATIONS ON LANDSLIDES ................................................. 2
A1  NGI PUBLICATIONS ON LANDSLIDES


Andersen, K.H. (1972). Skredet i Kimola fletningskanal i Finland (Clay slide in Kimola canal in Finland). Norwegian Geotechnical Institute, Oslo. Publication, 92, pp. 7-10, 73.


Appendix B - Landslide Literature in the NGI Library

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B2 REFERENCES ........................................................................................................... 2
B1 TIDSSKRIFTER

- Bulletin of Engineering Geology & the Environment – ISSN 1435-9529
- Canadian Geotechnical Journal – ISSN 0008-3674
- Earthquake Spectra – ISSN 8755-2930
- Engineering Geology – ISSN 0013-7952
- Int J of Rock Mechanics & Mining Sciences – ISSN 1365-1609
- J of Natural Disaster Science, Japan
- Landslide News, Japan
- Natural Hazards Review ASCE – ISSN 1527-6988
- Quarterly J of Engineering Geology and Hydrogeology – ISSN 0470-9236
- Soil Dynamics & Earthquake Engineering – ISSN 0267-7261
- Wildbach- und Lawinenverbau, Austria

B2 REFERENCES


Analysis and design of retaining structures against earthquakes: proceedings of sessions in conjunction with the ASCE National Convention in Washington, DC... 1996 / sponsored by the Soil Dynamics Committee of the Geo-Institute of the American Society of Civil Engineers *edited by Shamsrer Prakash. - New York : ASCE, 1996. - VII, 136s. : ill. - (Geotechnical special publication * No. 60); (ASCE GSP * 60) ISBN: 0-7844-0206-X


Landslides under static and dynamic conditions : analysis, monitoring and mitigation : proceedings of sessions in conjunction with the ASCE Convention in San Diego, California ... 1995 / sponsored by the Geotechnical Engineering Division of the American Society of Civil Engineers *edited by David K. Keefer and Carlton L. Ho. - New York : ASCE, 1995. - VII, 115s.: ill. - (Geotechnical special publication * No. 52); (ASCE GSP * 52) ISBN: 0-7844-0118-7.


Literature on Landslides

Appendix B


Landslide dams : processes, risk and mitigation : proceedings of a session in conjunction with the ASCE Convention in Seattle, Washington ... 1986 / sponsored by the Geotechnical Engineering Division of the American Society of Civil Engineers * edited by Robert L. Schuster. - New York : ASCE, 1986. - VII, 164s. : ill. - (Geotechnical special publication * No. 03); (ASCE GSP * 03 ) ISBN: 0-87262-524-9


Appendix C  - Literature on Lahars
<table>
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<th>No.</th>
<th>Title</th>
<th>Author(s)</th>
<th>Shear / stability</th>
<th>Unsat. pyroclastic soil</th>
<th>Erosion</th>
<th>Laboratory tests</th>
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<td>Structural analysis of the Casita slump: Origin, hazards and comparison with nearby volcanoes</td>
<td>van Wyk deVries, B., N. Kerle, and Jean-Luc Froger</td>
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<td>Landslide and lahar mapping using ERS radar images....</td>
<td>Froger, J.-L., B. van Wyk de Vries, Souvignet, T. Souriot &amp; B. Malengreau</td>
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<td>Volcanic landslides, debris avalanches, and debris flows in Nicaragua resulting from Hurricane Mitch, October-November 1998</td>
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<td>Mechanical behaviour of unsaturated pyroclastic soils</td>
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<td>Susceptibility of loose pyroclastic soils to static liquefaction – some preliminary data</td>
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<td>Landslides in Rio de Janeiro: Anthropogenic and weather effects</td>
<td>Amaral, C., Araruna, J. and Vargas jr., Euripides</td>
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<td>Einstein, H. H. and Karam, K. S.</td>
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<td>Joint disaster response and recovery mission to Central America as a follow-up to Hurricane Mitch</td>
<td>UN development programme et al.</td>
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<td>Landslides activation from earthquake motions</td>
<td>Konstantinov, B.K., K.A. Angelov, A.V. Lakov &amp; S.B. Stojnev</td>
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<td>Prob. analysis of rain-related occurrence and revival of landslides in Yunyang-Fengjie area in East Sichuan</td>
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<td>Landslide in recent Roodbar earthquake in Iran</td>
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<td>Erosion induced landslides in tropical environments</td>
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<td>A discussion of the physical parameters that control the flow of natural landslides.</td>
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<td>Enigmatic features and mechanism of debris flows and lahar</td>
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<td>Landslide hazard at the San Salvador volcano, El Salvador</td>
<td>Finnson, H., C. Bäcklin and A. Bodare</td>
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<td>Toward landslide risk assessment in practice</td>
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<td>Stability investigation and preventive works design for old fill slopes in Hong Kong</td>
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<td>Concepts of risk-based decision making with emphasis on geotechnical engineering and slope hazards</td>
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<td>Natural hazard landslide hazard management + Natural hazard management + A brief on natural hazards management in Canada</td>
<td>Lacasse, S., Lacasse, S. Morgenstern, N.R.</td>
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<td>Factors affecting rainfall-induced landslides in laboratory flume tests</td>
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<td>Failure of volcano slopes</td>
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<td>Role of apparent cohesion in the stability of Dominican allophane soil slopes</td>
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<td>Floods and landslides: Integrated risk assessment</td>
<td>Casale, F. and G. Margottini</td>
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<td>Precipitation-triggered debris-flow at Casita volcano, Nicaragua: Implications for mitigation strategies in volcanic and tectonically active steeplands</td>
<td>Scott, K.M.</td>
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Appendix D - List of References on Rainfall as Trigger for Landslides
Rainfall-triggered landslides: a reference list

P. De Vita · P. Reichenbach
with contributions by I. C. Bathurst · M. Borga · C. Crozé · T. Glade
F. Guzzetti · A. Hansen · J. Wasowski

In preparing this special issue of Environmental Geology, authors and reviewers pointed out that the literature on the subject of rainfall-triggered mass movements is vast and scattered in journals, books, proceedings, internal and technical reports pertaining to the realm of different sciences: geomorphology, hydrology, hydrogeology, soil science, pedology, agronomy, and forestry among others. This limits our ability to get an overall understanding of what is known or available on the subject. We compiled a list of the available literature that rapidly grew to more than 450 entries. The list was compiled by searching through the international as well as national literature.

Care was taken to include, where possible, references pertaining to the "grey" literature, such as that available from government and research institutions. These internal or technical reports, often unpublished, contain valuable information that remains largely unknown to the international scientific community. The reference list is comprehensive but by no means exhaustive. It contains references covering a variety of topics. Among the most important for the subject of this volume are: types, patterns, and causes of widespread landsliding; hydrological and hydrogeological causes of diffused landsliding; modelling slope groundwater response to rainfall; significance, role, extent, and availability of thresholds; scaling up versus scaling down; regionalization of detailed information on single slopes to larger catchments; usefulness of thresholds for the evaluation and mitigation of landslide hazard and risk.

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P. De Vita · P. Reichenbach · F. Guzzetti
CNR-BIT Perugia, via della Madonna Alta 126, I-06128 Perugia, Italy
Tel.: +39 075 050 4943 · e-mail: F.Guzzetti@lipi.pg.cnr.it

J. C. Bathurst
Department of Civil Engineering, University of Newcastle, NE1 7RU, UK

M. Borga
DIE SAF, AGRIPOLIS, via Romara, I-35020 Legnaro, Italy

G. Crosta
Dipartimento di Scienze della Terra, via Mangiagalli 34, I-20133 Milano, Italy

M. Crozé · T. Glade
Research School of Earth Science, Dept Geography, Victoria University, PO Box 600, Wellington, New Zealand

A. Hansen
47A Goldsworthy Rd, WA-6010, Australia

J. Wasowski
CNR-CERIST, via Orabona 4, I-70125 Bari, Italy


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Appendix E - Some Important Textbooks

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Zaruba, Q. and Mencl., V. (1982)

Morgenstern, N.R. (1992)


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Appendix F - Useful Web Sites
CALIFORNIA GEOLOGICAL SURVEY - LANDSLIDES
http://www.consrv.ca.gov/cgs/geologic_hazards/landslides/

FEMA: Fact Sheet: Landslides and Mudflows
http://landslides.usgs.gov/

Geologic Hazards--Landslides (USGS)
http://landslides.usgs.gov/

USGS Landslides
http://www.usgs.gov/themes/landslid.html

US National Landslide Information Center -- NLIC

The Natural Hazards Center - Boulder, Colorado - Information on Human Adaptation to Disaster
http://www.colorado.edu/hazards/index.htm

Terrain Inventory - Terrain Stability Hazards
http://srmwww.gov.bc.ca/rib/wis/terrain/publications/stability/chapter2.htm

US Global Change Research Information Office (global warming)
http://www.gcrio.org/index.shtml

Landslide in Japan Home Page
http://www.tuat.ac.jp/~sabo/lj/

SGI - Swedish Geotechnical Institute
http://www.swedgeo.se/index-e.html

Geological Seismic and Soil Survey, Assessorato programmi d'area, Qualità Edilizia, Sistemi informativi e telematici, Organizzazion
http://www.regione.emilia-romagna.it/geologia/eindex.htm

Neural Networks for Landslides (Tomas Fernandez-Steeeger)
http://www.gknk.uni-kalsruhe.de/tomas/Project.shtml

Italian landslides photos
http://www.geocities.com/RainForest/8211/

IMIRLAND Landslide Project, Italy
http://extranet.regione.piemonte.it/imiriland/
Landslide Slide Show - Kingston University, UK
http://www.kingston.ac.uk/~ku00323/landslid/slides.htm

Japan
http://icl.dpri.kyoto-u.ac.jp/

Landslides - Bibliographic databases (free search)

Earthquake Engineering Abstracts (EEA)
http://nisee.berkeley.edu/eea.html

SGI Line
http://www.swedgeo.se/login/signin.asp
**Protective Measures to Reduce the Landslide Risk in El Salvador. Literature on Landslides**

**Oppdragsgiver/Client**
Ministry of Foreign Affairs, Norway

**Kontraktsreferanse/Contract reference**

**Dokumenttittel/Document title**
Protective Measures to Reduce the Landslide Risk in El Salvador. Literature on Landslides

**Prosjektleder/Project Manager**
Oddvar Kjekstad

**Utarbeidet av/Prepared by**
Christian Jaedicke, Wenche Enersen

**Emneord/Keywords**
Landslides, lahars, NGI landslide literature

**Land, fylke/Country, County**
El Salvador

**Kommune/Municipality**

**Sted/Location**

**Kartblad/Map**

**UTM-koordinater/UTM-coordinates**

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