

## Chapter 3 Risk Assessment Landslide Idaho

*This doctoral thesis presents a novel approach to landslide risk assessment that explores the various dimensions of landslide risk in an integrated perspective. The research approach introduced here is tailored for use with landslide databases and Geographic Information Systems (GIS). A landslide susceptibility model is at the heart of this new approach, enabling to identify and delineate areas at risk of landslides and to assess infrastructure exposure. Landslide risk is a pressing societal issue that is still poorly understood. Temporal landslide hazard is derived from landslide frequency statistics and a hydrological simulation approach to estimate triggering thresholds. These methods are integrated into a powerful toolset for cost modeling that uses historical data to compile, model, and extrapolate damage costs on different spatial scales over time. The combination of this toolset with techniques to analyze fiscal cost impacts supports integrated risk assessment by quantifying the economic relevance of landslide losses.*

*Landslide Hazard and Risk* John Wiley & Sons

*Transport Infrastructure Asset management in transport infrastructure, financial viability of transport engineering projects/ Life cycle Cost Analysis, Life-Cycle Assessment and Sustainability Assessment of transport infrastructure/ Infrastructures financing and pricing with equity appraisal, operation optimization and energy management/ Low-Volume roads: planning, maintenance, operations, environmental and social issues/ Public-Private Partnership (PPP) experience in transport infrastructure in different countries and economic conditions/ Airport Pavement Management Systems, runway design and maintenance/ Port*

*maintenance and development issues, technology relating to cargo handling, landside access, cruise operations/ Infrastructure Building Information Modelling (I-BIM) / Pavement design and innovative bituminous materials/ Recycling and re-use in road pavements, environmentally sustainable technologies/ Stone pavements, ancient roads and historic railways/ Cementitious stabilization of materials used in the rehabilitation of transportation infrastructure. Transport Systems Sustainable transport and the environment protection including green vehicles/ Urban transport, land use development, spatial and transport planning/ Bicycling, bike, bike-sharing systems, cycling mobility/ Human factor in transport systems/ Intelligent Mobility: emerging technologies to enable the smarter movement of people and goods/Airport landside: access roads, parking facilities, terminal facilities, aircraft apron and the adjacent taxiway/ Transportation policy, planning and design, modelling and decision making/ Transport economics, finance and pricing issues, optimization problems, equity appraisal/ Road safety impact assessments, road safety audits, the management of road network safety and safety inspections/ Tunnels and underground structures: preventing incidents-accidents mitigating their effects for both people and goods/ Traffic flow characteristics, traffic control devices, work zone traffic control, highway capacity and quality of service/ Track-vehicle interactions in railway systems, capacity analysis of railway networks/ Risk assessment and safety in air and railway transport, reliability aspects/ Maritime transport and inland waterways transport research/ Intermodal freight transport: terminals and logistics.*

*Large landslides affect many mountain valleys in Europe. They are characterised by a low probability of evolution into a catastrophic event but can have very large impacts on population, infrastructures and the environment. This impact is becoming more and more pronounced due*

*to increasing tourism and the construction of new roads and railways in mountainous areas. Methodologies for the assessment and mitigation of risks are therefore a major issue. Since very large slope movements are quite often directly or indirectly implicated in disasters, like landslides, secondary slides or debris flow, their early identification is essential to an adequate risk assessment of the zones involved. The assessment of risks due to large landslides in the alpine environment is the first activity carried out within the IMIRILAND Project. This project involves seven partners representing five European countries and is funded by the European Commission within the Fifth Framework Program (Research and Technological Development, Activities of a Generic Nature: the Fight against Major Natural and Technological Hazards). The objective of this cooperation is to develop risk management methodologies and mitigation strategies that can be applied at a European level as useful tools for administrators and land users. To this end, by means of a multidisciplinary approach the hazard analysis of some selected large landslides was examined with a particular focus on geological, geomorphological and geo-mechanical methods. In addition, vulnerability and risk analyses were carried out to enable the consideration of direct and indirect consequences, as well as technical and social impacts. The developed risk assessment procedure was critically examined through application to some selected landslides. Identification and Mitigation of Large Landslide Risks in Europe – Advances in Risk Assessment presents the risk assessment procedure developed and the case studies that were performed within the framework of the IMIRILAND Project. It is edited by Arpa Piemonte, Ecole Polytechnique Fédérale de Lausanne and Politecnico di Torino This book is intended for geotechnical engineers, engineering geologists, geomorphologists and planners who are involved in*

*landslides and in assessing the stability of natural slopes.*

*Potentials and Challenges*

*Landslide Databases as Tools for Integrated Assessment of Landslide Risk*

*Landslide Risk*

*Assessment of the National Landslide Hazards Mitigation Strategy*

*Field Instrumentation for Soil and Rock*

*Handbook of Slope Stabilisation*

Landslides occur in all geographic regions of the nation in response to a wide range of conditions and triggering processes that include storms, earthquakes, and human activities. Landslides in the United States result in an estimated average of 25 to 50 deaths annually and cost \$1 to 3 billion per year. In addition to direct losses, landslides also cause significant environmental damage and societal disruption. Partnerships for Reducing Landslide Risk reviews the U.S. Geological Survey's (USGS) National Landslide Hazards Mitigation Strategy, which was created in response to a congressional directive for a national approach to reducing losses from landslides. Components of the strategy include basic research activities, improved public policy measures, and enhanced mitigation of landslides. This report commends the USGS for creating a national approach based on partnerships with federal, state, local, and non-governmental entities, and finds that the plan components are the essential elements of a national strategy. Partnerships for Reducing Landslide Risk recommends that the plan should promote the use of risk analysis techniques, and should play a vital role in evaluating methods, setting

standards, and advancing procedures and guidelines for landslide hazard maps and assessments. This report suggests that substantially increased funding will be required to implement a national landslide mitigation program, and that as part of a 10-year program the funding mix should transition from research and guideline development to partnership-based implementation of loss reduction measures.

Science and Technology in Disaster Risk Reduction in Asia: Potentials and Challenges provides both a local and global perspective on how to implement the Sendai Framework for Disaster Risk Reduction. Topics demonstrate the advancement of scientific research as it applies to early warning systems, including identifying risk and the strengthening of infrastructure for different types of hazards. Through different major disasters, it has become evident that there must be a balance between hard and soft technology and physical, process and social solutions. This book demonstrates how this has been successfully implemented in Asia, and how these applications can apply on a global basis.

Covers new research on the role of science in Disaster Risk Reduction and lessons learned when research has been applied Utilizes case studies to outline the broader lessons learned Focuses on the Sendai Framework, which was adopted in the Third UN World Conference in 2015

Communication of risks within a transparent and accountable framework is essential in view of increasing mobility and the complexity of the modern society and the field of geotechnical engineering does not form an exception. As a result, modern risk assessment and management are required in all aspects of

geotechnical issues, such as planning, desi

This book is one out of six IAEG XIII Congress and AEG 61st Annual Meeting proceeding volumes, and deals with topics related to slope stability including case histories, landslide mapping, and emerging technologies. The theme of the IAEG/AEG Meeting, held in San Francisco from September 17-21, 2018, is Engineering Geology for a Sustainable World. The meeting proceedings analyze the dynamic role of engineering geology in our changing world. The meeting topics and subject areas of the six volumes are: Slope Stability: Case Histories, Landslide Mapping, Emerging Technologies; Geotechnical and Environmental Site Characterization; Mining, Aggregates, Karst; Dams, Tunnels, Groundwater Resources, Climate Change; Geologic Hazards: Earthquakes, Land Subsidence, Coastal Hazards, and Emergency Response; and Advances in Engineering Geology: Education, Soil and Rock Properties, Modeling.

Proceedings of the AIIT International Congress on Transport Infrastructure and Systems (Rome, Italy, 10-12 April 2017)

Community-Based Landslide Risk Reduction

Landslides and Engineered Slopes. Experience, Theory and Practice

Science and Technology in Disaster Risk Reduction in Asia

Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools

Landslides in Sensitive Clays

**Extreme weather and climate change aggravate the frequency and magnitude of disasters. Facing atypical and more severe events, existing early warning and**

**response systems become inadequate both in scale and scope. Earth Observation (EO) provides today information at global, regional and even basin scales related to agrometeorological hazards. This book focuses on drought, flood, frost, landslides, and storms/cyclones and covers different applications of EO data used from prediction to mapping damages as well as recovery for each category. It explains the added value of EO technology in comparison with conventional techniques applied today through many case studies.**

**Landslide Risk Management comprises the proceedings of the International Conference on Landslide Risk Management, held in Vancouver, Canada, from May 31 to June 3, 2005. The first part of the book contains state-of-the-art and invited lectures, prepared by teams of authors selected for their experience in specific topics assigned to them by the JTC-1 Committee. The second part is a selection of papers submitted to the conference, most of which serve as case-history illustrations of projects on landslide risk management. This reference work presents the current status of landslide risk management as viewed by experts from around the world.**

**This book documents the First World Landslide Forum, which was jointly organized by the International Consortium on Landslides (ICL), eight UN organizations (UNESCO, WMO, FAO, UN/ISDR, UNU, UNEP, World Bank, UNDP) and four NGOs (International Council for Science, World Federation of Engineering Organizations, Kyoto Univ. and Japan Landslide Society) in Tokyo in 2008. The material consists of four parts: The Open Forum "Progress of IPL Activities; Four Thematic Lectures in the Plenary Symposium "Global Landslide Risk Reduction"; Six Keynote Lectures in the Plenary**

**session; and the aims and overviews of eighteen parallel sessions (dealing with various aspects necessary for landslide disaster risk reduction such as: observations from space; climate change and slope instability; landslides threatening heritage sites; the economic and social impact of landslides; monitoring, prediction and early warning; and risk-management strategies in urban area, etc.) Thus it enables the reader to benefit from a wide range of research intended to reduce risk due to landslide disasters as presented in the first global multi-disciplinary meeting.**

**Disaster Risk Reduction for the Built Environment provides a multi-faceted introduction to how a wide range of risk reduction options can be mainstreamed into formal and informal construction decision making processes, so that Disaster Risk Reduction (DRR) can become part of the 'developmental DNA'. The contents highlight the positive roles that practitioners such as civil and structural engineers, urban planners and designers, and architects (to name just a few) can undertake to ensure that disaster risk is addressed when (re)developing the built environment. The book does not set out prescriptive ('context blind') solutions to complex problems because such solutions can invariably generate new problems. Instead it raises awareness, and in doing so, inspires a broad range of people to consider DRR in their work or everyday practices. This highly-illustrated text book provides a broad range of examples, case studies and thinking points that can help the reader to consider how DRR approaches might be adapted for differing contexts.**

**Partnerships for Reducing Landslide Risk**

**Glissement de Terrain : Evaluation Et Stabilisation**



### **Landslide Risk Assessment**

#### **Volume 1 Sendai Landslide Partnerships and Kyoto Landslide Commitment**

#### **Laser Scanning Applications in Landslide Assessment**

#### **Advances in Risk Assessment**

Landslides are destructive processes causing casualties and damage worldwide. The majority of the landslides are triggered by intense and/or prolonged rainfall. Therefore, the prediction of the occurrence of rainfall-induced landslides is an important scientific and social issue. To mitigate the risk posed by rainfall-induced landslides, landslide early warning systems (LEWS) can be built and applied at different scales as effective non-structural mitigation measures. Usually, the core of a LEWS is constituted of a mathematical model that predicts landslide occurrence in the monitored areas. In recent decades, rainfall thresholds have become a widespread and well established technique for the prediction of rainfall-induced landslides, and for the setting up of prototype or operational LEWS. A rainfall threshold expresses, with a mathematic law, the rainfall amount that, when reached or exceeded, is likely to trigger one or more landslides. Rainfall thresholds can be defined with relatively few parameters and are very straightforward to operate, because their application within LEWS is usually based only on the comparison of monitored and/or forecasted rainfall.

This Special Issue collects contributions on the recent research advances or well-documented applications of rainfall thresholds, as well as other innovative methods for landslide prediction and early warning. Contributions regarding the description of a LEWS or single components of LEWS (e.g., monitoring approaches, forecasting models, communication strategies, and emergency management) are also welcome. We encourage, in particular, the submission of contributions concerning the definition and validation of rainfall thresholds, and their operative implementation in LEWS. Other approaches for the forecasting of landslides are also of interest, such as physically based modelling, hazard mapping, and the monitoring of hydrologic and geotechnical indicators, especially when described in the framework of an operational or prototype early warning system.

The uptake of ecosystem-based approaches for disaster risk reduction (DRR) is slow, however, despite some success stories. There are multiple reasons for this reluctance: ecosystem management is rarely considered as part of the portfolio of DRR solutions because the environmental and disaster management communities typically work independently from each other; its contribution to DRR is highly undervalued compared to engineered solutions and therefore not given appropriate budget allocations; and there are poor interactions between

policymakers and researchers, leading to unclear and sometimes contradictory scientific information on the role of ecosystems for DRR. The aim of this book is to provide an overview of knowledge and practice in this multidisciplinary field of ecosystems management and DRR. The contributors, professionals from the science and disaster management communities around the world, represent state-of-the-art knowledge, practices, and perspectives on the topic.

This book is aimed at the practising engineer and engineering geologist working in tropical environments, where lands lides are mainly triggered by rain fall. This book is based on a similar work published in 1999 in Portuguese, which became the Rio de Janeiro Slope Manual. This book is an engineering guide for the design of slopes and stabilisation works in rocks and residual soils. It evolves from the cumulative experience gathered by several engineers and geologists who faced severe slope problems. The authors' experience throughout Central and South America (Costa Rica, Argentina, Bolivia, Peru, Ecuador and Venezuela) and the Far East, especially Hong Kong and Malaysia, was used as a foundation for writing this book. The work also benefits enormously from the time spent in Hong Kong in 1996 and 1997 by the first editor on sabbatical at the City University of Hong Kong, and the discussions he had with many colleagues from the Geotechnical Engineering Office (GEO) of the Hong Kong Government,

especially Dr. A. Malone, Mr. w.K. Pun, Dr. A. Li, Mr. K. Ho, and Mr. y.c. Chan among others.

The handbook details the MoSSaiC (Management of Slope Stability in Communities) methodology, which aims to create behavioral change in vulnerable communities in developing countries. Focusing on maximizing within-country capacity to deliver landslide mitigation measures on the ground, it provides an end-to-end blueprint for the mitigation process.

IAEG/AEG Annual Meeting Proceedings, San Francisco, California, 2018 - Volume 1

LANDSLIDE: INVESTIGATIONS AND STABILIZATION MEASURES FOR SAFER GEO-ENVIRONMENT

Floods and Landslides: Integrated Risk Assessment

Integrated Risk Assessment ; with 30 Tables

Rainfall Thresholds and Other Approaches for Landslide Prediction and Early Warning

Investigation and Monitoring

***These volumes comprise the Proceedings of the Ninth International Symposium on Landslides, held in Rio de Janeiro, Brazil, from June 28 to July 2, 2004. Information***

*on the latest developments in Landslide Studies is presented by invited lecture reports, specialized panel contributions and over two hundred and forty technical papers, grouped in the*

*This interactive book presents comprehensive information on the fundamentals of landslide types and dynamics, while also providing a set of PPT, PDF, and text tools for education and capacity development. It is the second part of a two-volume work created as the core activity of the Sendai Partnerships, the International Consortium of Landslides. The book will be regularly updated and improved over the coming years, based on responses from users and lessons learned during its application.*

*Landslides are the most costly geo-hazard in the world, and they're often the cause or the result of other hazards and disasters such as tsunamis, earthquakes, wildfires, and volcanic eruptions. Landslide Hazards, Risks, and Disasters makes a close and detailed examination of major mass movements and provides measures for more thorough and*

*accurate monitoring, prediction, preparedness, and prevention. It takes a geoscientific approach to the topic while also discussing the impacts human-induced causes such as deforestation, blasting, and building construction—underscoring the multi-disciplinary nature of the topic. Contains contributions from expert geologists, seismologists, geophysicists, and environmental scientists selected by a world-renowned editorial board Presents the latest research on causality, economic impacts, fatality rates, and landslide and problem soil preparedness and mitigation Numerous tables, maps, diagrams, illustrations, photographs, and video captures of hazardous processes Discusses steps for prevention and treatment of problem soils, the most expensive geo-hazard in the world The Global Assessment Report on Disaster Risk Reduction (GAR) is the flagship report of the United Nations on worldwide efforts to reduce disaster risk. The GAR is published biennially by the UN Office for Disaster Risk Reduction (UNDRR), and is the product of the contributions*

*of nations, public and private risk-related science and research, amongst others. The GAR contributes to achieving the Sendai Framework for Disaster Risk Reduction and the 2030 Agenda for Sustainable Development through monitoring risk patterns and trends, as well as progress in disaster risk reduction, while providing strategic policy guidance to countries and the international community. The GAR aims to focus international attention on the issue of risk and encourage political and economic support for risk reduction.*

*Risk Analysis and Sustainable Disaster Management*

*From Geosciences to Risk Management*

*Multi-hazard Approaches to Civil Infrastructure Engineering*

*Landslide Hazard and Risk*

*The Role of Ecosystems in Disaster Risk Reduction*

*Landslides: Evaluation and Stabilization/Glisserment de Terrain: Evaluation et Stabilisation, Set of 2 Volumes*

Landslides in sensitive clays represent a major hazard in the northern countries of the world such as Canada, Finland, Norway, Russia, Sweden and in the US state of

Alaska. Past and recent examples of catastrophic landslides at e.g. Saint-Jean-Vianney in 1971, Rissa in 1979, Finneidfjord in 1996 and Kattmarka in 2009 have illustrated the great mobility of the remolded sensitive clays and their hazardous retrogressive potential. These events call for a better understanding of landslide in sensitive clay terrain to assist authorities with state-of-the-art hazard assessment methods, risk management schemes, mitigation measures and planning. During the last decades the elevated awareness regarding slope movement in sensitive clays has led to major advances in mapping techniques and development of highly sophisticated geotechnical and geophysical investigation tools. Great advances in numerical techniques dealing with progressive failure and landslide kinematic have also lead to increase understanding and predictability of landslides in sensitive clays and their consequences. This volume consists of the latest scientific research by international experts dealing with geological, geotechnical and geophysical aspects of slope failure in sensitive clays and focuses on understanding the full spectrum of challenges presented by landslides in such brittle materials.

This book is open access under a CC BY 4.0 license. This volume contains peer-reviewed papers from the Fourth World Landslide Forum organized by the International Consortium on Landslides (ICL), the Global Promotion Committee of the International Programme on Landslides (IPL), University of Ljubljana (UL) and Geological Survey of Slovenia in Ljubljana, Slovenia from May 29 to June 2, 2017.



The complete collection of papers from the Forum is published in five full-color volumes. This first volume contains the following:

- Three forum lectures
- Background and Content of the Sendai Partnerships 2015-2025
- Contribution from the signatory organizations of the Sendai Partnerships
- Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools (LIT T)
- Progress of the World Report on Landslides (WRL)
- International Programme on Landslides (IPL): Objects, History and List of WCoE/IPL projects
- UNESCO-KU-ICL UNITIWIN Network supporting IPL
- Landslides: Journal of International Consortium on Landslides
- International Programme on Landslides (IPL): WCoEs and IPL Projects
- Landslides and Society

Prof. Kyoji Sassa is the Founding President of the International Consortium on Landslides (ICL). He is Executive Director of ICL and the Editor-in-Chief of International Journal Landslides since its foundation in 2004. Prof. Matjaž Mikoš is the Forum Chair of the Fourth World Landslide Forum. He is the Vice President of International Consortium on Landslides and President of the Slovenian National Platform for Disaster Risk Reduction. Prof. Yueping Yin is the President of the International Consortium on Landslides and the Chairman of the Committee of Geo-Hazards Prevention of China, and the Chief Geologist of Geo-Hazard Emergency Technology, Ministry of Land and Resources, P.R. China. IPL (International Programme on Landslides) is a programme of the ICL. The programme is managed by the IPL Global Promotion Committee including ICL and ICL supporting

organizations, UNESCO, WMO, FAO, UNISDR, UNU, ICSU, WFEO, IUGS and IUGG. The IPL contributes to the United Nations International Strategy for Disaster Reduction and the ISDR-ICL Sendai Partnerships 2015-2025.

The 25 papers collected together in this volume present comprehensive coverage of all major aspects of landslide risk assessment, including the risk assessment framework, and methods for estimating probability of landsliding vulnerability and risk.

This book integrates the physical processes of dam breaching and the mathematical aspects of risk assessment in a concise manner • The first book that introduces the causes, processes and consequences of dam failures • Integrates the physical processes of dam breaching and the mathematical aspects of risk assessment in a concise manner • Emphasizes integrating theory and practice to better demonstrate the application of risk assessment and decision methodologies to real cases • Intends to formulate dam-breaching emergency management steps in a scientific structure

Transport Infrastructure and Systems

Assessment, Management and Reduction

Global Assessment Report on Disaster Risk Reduction 2019

Advancing Culture of Living with Landslides

Proceedings of the Ninth International Symposium on Landslides, June 28 -July 2,

2004 Rio de Janeiro, Brazil

Landslides - Disaster Risk Reduction

*Landslide Hazards, Risks and Disasters 2nd edition makes a broad but detailed examination of major aspects of mass movements and their consequences, and provides knowledge to form the basis for more complete and accurate monitoring, prediction, preparedness and reduction of the impacts of landslides on society. The frequency and intensity of landslide hazards and disasters has consistently increased over the past century, and this trend will continue as society increasingly utilises steep landscapes. Landslides and related phenomena can be triggered by other hazard and disaster processes – such as earthquakes, tsunamis, volcanic eruptions and wildfires – and they can also cause other hazards and disasters, making them a complex multi-disciplinary challenge. This new edition of Landslide Hazards, Risks and Disasters is updated and includes new chapters, covering additional topics including rockfalls, landslide interactions and impacts and geomorphic perspectives. Knowledge, understanding and the ability to model landslide processes are becoming increasingly important challenges for society extends its occupation of increasingly hilly and mountainous terrain, making this book a key resource for educators, researchers and disaster managers in geophysics, geology and environmental science. Provides an interdisciplinary perspective on the geological, seismological, physical, environmental and social impacts of landslides*

*Presents the latest research on causality, impacts and landslide preparedness and mitigation. Includes numerous tables, maps, diagrams, illustrations, photographs and video captures of hazardous processes Discusses steps for planning for and responding to landslide hazards, risks and disasters*

*These 28 papers presented at the American Society for Testing and Materials symposium held in June 1998 are organized by the major session topics of instrumentation associated with: soil structure interaction, monitoring landfills, and monitoring settlement and stability; and field data acquisition*

*This book is related to various applications of laser scanning in landslide assessment. Landslide detection approaches, susceptibility, hazard, vulnerability assessment and various modeling techniques are presented. Optimization of landslide conditioning parameters and use of heuristic, statistical, data mining approaches, their advantages and their relationship with landslide risk assessment are discussed in detail. The book contains scanning data in tropical forests; its indicators, assessment, modeling and implementation. Additionally, debris flow modeling and analysis including source of debris flow identification and rockfall hazard assessment are also presented.*

*Landslides and Engineered Slopes. Experience, Theory and Practice contains the invited lectures and all papers presented at the 12th International Symposium on Landslides, (Naples, Italy, 12-19 June 2016). The book aims to emphasize the relationship between*

*landslides and other natural hazards. Hence, three of the main sessions focus on Volcanic-induced landslides, Earthquake-induced landslides and Weather-induced landslides respectively, while the fourth main session deals with Human-induced landslides. Some papers presented in a special session devoted to "Subareal and submarine landslide processes and hazard" and in a "Young Session" complete the books. Landslides and Engineered Slopes. Experience, Theory and Practice underlines the importance of the classic approach of modern science, which moves from experience to theory, as the basic instrument to study landslides. Experience is the key to understand the natural phenomena focusing on all the factors that play a major role. Theory is the instrument to manage the data provided by experience following a mathematical approach; this allows not only to clarify the nature and the deep causes of phenomena but mostly, to predict future and, if required, manage similar events. Practical benefits from the results of theory to protect people and man-made works. Landslides and Engineered Slopes. Experience, Theory and Practice is useful to scientists and practitioners working in the areas of rock and soil mechanics, geotechnical engineering, engineering geology and geology.*

*Understanding and Reducing Landslide Disaster Risk*

*Geotechnical Risk and Safety*

*Disaster Risk Reduction for the Built Environment*

*Landslide Risk Case Studies in Forest Development Planning and Operations*  
*Volume 2: Testing, Risk Management and Country Practices*  
*Landslide Risk Management*

Over the past decade there has been a gradual shift away from simply relying on engineering solutions to individual landslide problems, to the use of a variety of strategies to manage the problems over a broad area. Such alternative strategies include the use of building codes, land use planning controls, preventing water leakage, early warning systems and insurance schemes. This book addresses these developments and provides a multidisciplinary perspective on landslide management. This collection focuses on the development of novel approaches to address one of the most pressing challenges of civil engineering, namely the mitigation of natural hazards. Numerous engineering books to date have focused on, and illustrate considerable progress toward, mitigation of individual hazards (earthquakes, wind, and so forth.). The current volume addresses concerns related to overall safety, sustainability and resilience of the built environment when subject to multiple hazards: natural disaster events that are concurrent and either correlated (e.g., wind and surge); uncorrelated (e.g., earthquake and flood); cascading (e.g., fire following earthquake); or uncorrelated and occurring at different times (e.g., wind and earthquake). The authors examine a range of specific topics including methodologies for vulnerability assessment of structures, new techniques to reduce the system demands through control systems;

instrumentation, monitoring and condition assessment of structures and foundations; new techniques for repairing structures that have suffered damage during past events, or for structures that have been found in need of strengthening; development of new design provisions that consider multiple hazards, as well as questions from law and the humanities relevant to the management of natural and human-made hazards.

With the increasing need to take an holistic view of landslide hazard and risk, this book overviews the concept of risk research and addresses the sociological and psychological issues resulting from landslides. Its integrated approach offers understanding and ability for concerned organisations, landowners, land managers, insurance companies and researchers to develop risk management solutions. Global case studies illustrate a variety of integrated approaches, and a concluding section provides specifications and contexts for the next generation of process models.

This book reviews the state of the art of natural disasters like floods and landslides, highlighting the possibility of safe and correct land planning and management by means of a global approach to territory. In fact, the events deriving from slope dynamics (gravitational phenomena) and fluvial dynamics (floods) are commonly triggered by the same factor (heavy rainfall), occur at the same time and are closely related. For this reason, this book analyses floods and slope stability phenomena as different aspects of the same dynamic system: the drainage basin.

Managing Disasters in Small Steps

Slope Stability: Case Histories, Landslide Mapping, Emerging Technologies  
Proceedings of the 2nd International Symposium on Geotechnical Safety and Risk (IS-Gifu 2009) 11-12 June, 2009, Gifu, Japan - IS-Gifu2009

Volume 1 ISDR-ICL Sendai Partnerships 2015-2025

Identification and Mitigation of Large Landslide Risks in Europe

**The research work focuses on detailed large scale mapping, Geological & Geo- Technical Investigation, slope stability assessment and stabilization measures of Dhalli & Jhakri Landslide, Shimla District, Himachal Pradesh and Kotropi Landslide, Mandi District, Himachal Pradesh. Dhalli landslide occurred on 2nd September, 2017 was a structurally controlled rock slide that occurred along a Road cut slope National highway (NH – 5A) without proper toe support. Jhakri landslide is also located along the steep slope section of a National highway (NH-22) connecting Rampur and Jhakri area. Kotropi landslide occurred on August, 2017 along the Mandi – Pathankot national highway (NH-154). The landslide is of complex type**



with deep seated failure with huge social and economic loss. Landslide susceptibility map (LSM) have been developed for the Dhalli, Jhakri and Kotropi landslide. The results reveal that for Dhalli landslide site 42.15% of the total area was covered in moderately vulnerable zone and 57.85% of the area is covered in High and very high vulnerable area. In Jhakri landslide site 100% of the total area was covered in Very High vulnerable zone. LSM of Kotropi study area reveal that 43.5% of the total area was covered in moderate vulnerable zone, 42.5% falls under high vulnerable zone and 15% falls under very high vulnerable zone. Large scale mapping of the landslide sites Dhalli and Jhakri were conducted through total station. The results reveal that all the study areas are located along steep slopes of various National highways.

Landslides - Investigation and Monitoring offers a comprehensive overview of recent developments in the field of mass movements and landslide hazards. Chapter authors use in situ measurements, modeling, and remotely sensed

data and methods to study landslides. This book provides a thorough overview of the latest efforts by international researchers on landslides and opens new possible research directions for further novel developments.

Based on contributions to the first General Assembly of the International Consortium on Landslides, this reference and status report emphasizes the mechanisms of different types of landslides, landslide risk analysis, and sustainable disaster management. It comprises the achievements of the ICL over the past three years, since the Kyoto assembly. It consists of three parts: research results of the International Programme on Landslides (IPL); contributions on landslide risk analysis; and articles on sustainable disaster management. In addition, the history of the ICL activities (under the support of UNESCO, WMO, FAO, UN/ISDR, and UNU) is recounted to create a comprehensive overview of international activity on landslides. The contributions reflect a wide range of topics and concerns, ranging from field studies, identification of objects of cultural

heritage at landslide risk, as well as landslide countermeasures.

"This handbook presents a framework for landslide risk management, describes technical terms and methods of landslide risk analysis, and presents 8 case studies prepared by experienced and knowledgeable terrain stability professionals. It has been prepared for both terrain stability professionals and forest resource managers"--Abstract.

Proceedings of the 12th International Symposium on Landslides (Napoli, Italy, 12-19 June 2016)

Dam Failure Mechanisms and Risk Assessment

Remote Sensing of Hydrometeorological Hazards

Landslide Hazards, Risks, and Disasters

Landslides

***This book is a part of ICL new book series "ICL Contribution to Landslide Disaster Risk Reduction" founded in 2019. Peer-reviewed papers submitted to the Fifth World Landslide Forum were published in six volumes of this book series. This book contains the followings: • Four***

**Forum lectures and one award paper • Sendai Landslide Partnerships, Kyoto Landslide Commitment, and International Programme on Landslides. • Landslide-induced tsunamis • Landslides at UNESCO designates sites and contribution from WMO, FAO, and IRDR • Education and Capacity Development for Risk Management and Risk Governance**

**Prof. Kyoji Sassa is the Founding President and the Secretary-General of International Consortium on Landslides (ICL). He has been the Editor-in-Chief of International Journal Landslides since its foundation in 2004. Prof. Matjaž Mikoš is the Vice President of International Consortium on Landslides and Vice President of Slovenian Academy of Engineering. He is a Professor and Dean of Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia. Dr. Shinji Sassa is Head of Soil Dynamics Group and Research Director of International Research Center for Coastal Disasters, Port and Airport Research Institute, National Institute of Maritime, Port and Aviation Technology, Japan. Prof. Peter Bobrowsky is the President of International Consortium on Landslides. He is a Senior Scientist of Geological Survey of Canada, Ottawa, Canada. Prof. Kaoru Takara is the Executive Director of International Consortium on Landslides. He is a Professor and Dean of Graduate School of Advanced Integrated Studies (GSAIS) in Human Survivability (Shishu-Kan), Kyoto University. Dr. Khang Dang is the Secretary General of the Fifth World Landslide Forum. He also serves as the Research Promotion**

**Officer of ICL and a Lecturer at the University of Science, Vietnam National University, Hanoi.**

**A landslide is a major geological hazard, which poses a serious threat to the global human population and various infrastructures like highways, rail routes and civil structures like dams, buildings and others. Landslides occur very often during other major natural disasters such as earthquakes, floods and volcanoes. The word landslide represents only a type of movement that is a slide. However, it is generally used as a term to cover all the types of land movements including falls, creeps, spreads, flows and other complex movements. Geological risk is a relatively new and not fully explored concept. There are many definitions of geological risk. Oftentimes, a scientific study or a scientific approach to the problem begins with a presentation of the author's position and the choice of the definition of geological risk for this problem. One of the most common approaches defines risk as the expectation of the damage, or the product of the probability of possible hazardous events on the damage produced. The problem with landslide risk management is that it is seen as a series of events leading to landslide risk reduction. It includes landslide monitoring, mapping, landslide forecast, engineering, slope strengthening, insurance and others. Strictly speaking, geological risk management includes: 1. Risk analysis and assessment; 2. Risk mapping (for the purposes of management); 3. Methods of risk management: a)**

***regulatory normative-legal methods; b) organisational and administrative methods; c) economic methods (direct and indirect); d) insurance; e) engineering and technical methods - active and passive (monitoring); 4. Concept of acceptable risk. This monograph is devoted to landslide research based on the concept risk analysis, assessment, management and reduction.***