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Development of ICL landslide teaching tools

Abstract Capacity development is important and urgently needed for landslide disaster risk reduction. This is especially so in developing countries where mountain and urban development is accelerating most rapidly, including construction of highways and railways and residential complexes. However, effective tools to teach practical landslide risk reduction knowledge and skills are not available. Therefore, International Consortium on Landslides (ICL) has decided to compile a collection of landslide teaching tools (Sassa et al. 2013) to provide teaching materials to ICL members and other landslide teaching entities to assist in education of university students, local government officers, staff in nongovernmental organizations, and the public. The teaching toolbox contains five parts: (1) mapping and site prediction; (2) monitoring and early warning; (3) testing and numerical simulation; (4) risk management; and (5) country practices and case studies. The teaching toolbox contains three types of tools: (1) TXT tools consisting of original texts with figures; (2) PDF tools consisting of already published reference papers, manuals, guidelines, and others; and (3) PPT tools consisting of PowerPoint® files made for lectures. The initial TXT tools have been published as a full color booklet (405 pages). The PDF tools and PPT tools are contained in a CD. The basic concept and a list of contents of the ICL landslide teaching tools are introduced in this article.

Keywords ICL · Landslide · Teaching tools · Development

Introduction

International Consortium on Landslides (ICL) obtained official development assistance (ODA) funds to support UNESCO activities to promote education, science, and culture by nongovernmental organizations. The support was provided from the Director-General Office for International Affairs of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan. The target of this budget was Asia and the Pacific area. The ICL strategic plan for 2012–2021 indicates a need to develop teaching materials for use in developing countries. Therefore, ICL has compiled these landslide teaching tools including original texts made for this purpose, PDFs of already published documents, and PowerPoint® presentations (.ppt) for lectures. ICL requested contributions from ICL members in Asia such as Indonesia, Thailand, India, Malaysia, Iran, Vietnam, and Japan as well as New Zealand. An inaugural meeting was held at UNITWIN headquarters in Kyoto University's Uji campus in June 2012. The concept and outline of the teaching tools gradually emerged and consolidated at a series of meeting in October (Kyoto) and November (UNESCO, Paris) 2012 and January and February 2013 (UNITWIN headquarters, Kyoto). Some members from developed countries (Croatia, Italy, and Chinese Taipei) also contributed tools. In this article, the aim and background of ICL landslide teaching tools, the framework of the teaching tools, and the contents of all the tools (TXT tools, PDF tools, and PPT tools) are explained. The refreshing and future direction of these teaching tools, and the process of how to further contribute to the ICL landslide teaching tools are discussed.

Aims and background

ICL was established by adopting its statutes in January 2002. It was registered as a legal body (No. 1300-05-005237) under the Japanese law in the Kyoto Prefectural Government, Japan, in August 2002. ICL established the University Twinning and Networking (UNITWIN) Cooperation Programme on landslide risk mitigation for society and the environment with UNESCO and Kyoto University in March 2003. The UNITWIN headquarters building was constructed by ICL and Kyoto University at Kyoto University Uji campus in September 2004 (International Consortium on Landslides Leaflet 2012). The teaching-tool activities and meetings to create it were conducted at the UNITWIN headquarters building.

The ICL strategic plan 2012–2021 was reported in the Preface of Landslides, Vol. 9, No. 2, 2012 (Sassa 2012). In the ICL strategic plan for 2012–2021, ICL identifies seven action plans to meet the challenges of the next decade. Among these, preparing of the landslide teaching tools was planned to strengthen capacity development.

Outline of the teaching tools

The front cover of the book "ICL Landslide Teaching Tools" is shown in Fig. 1. The outline of the teaching tools in the first edition of the landslide teaching toolbox is shown in Fig. 2 and presented below.

Copyright and responsibility for each teaching tool

ICL called for contributions and compiled the accepted teaching tools. Copyright and responsibility for the content of each tool lies with its contributing organization. Each tool may be updated by the contributing organization.

Content of the teaching tools

The teaching toolbox contains five parts:

1. Mapping and site prediction
2. Monitoring and early warning
3. Testing and numerical simulation
4. Risk management and others
5. Country practices and case studies

Types of teaching tools

The teaching toolbox contains three types of tools.

1. TXT tools consisting of original texts with figures
2. PDF tools consisting of already published reference papers, manuals, guidelines, laws, codes, and others. They are on the accompanying CD as .pdf files.
3. PPT tools consisting of PowerPoint® files made for lectures. They are saved in DVD.

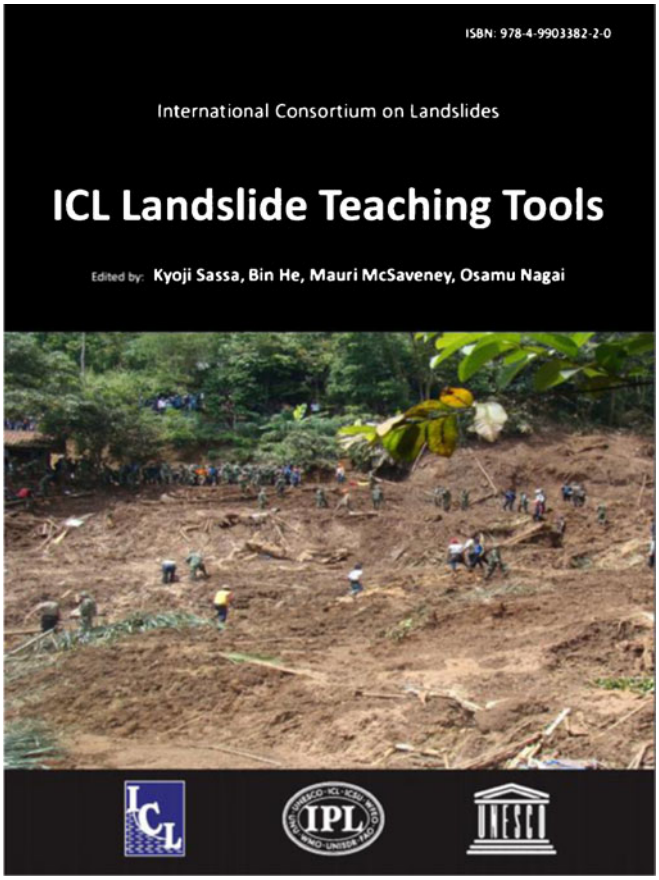

Fig. 1 Front cover of the ICL landslide teaching tools

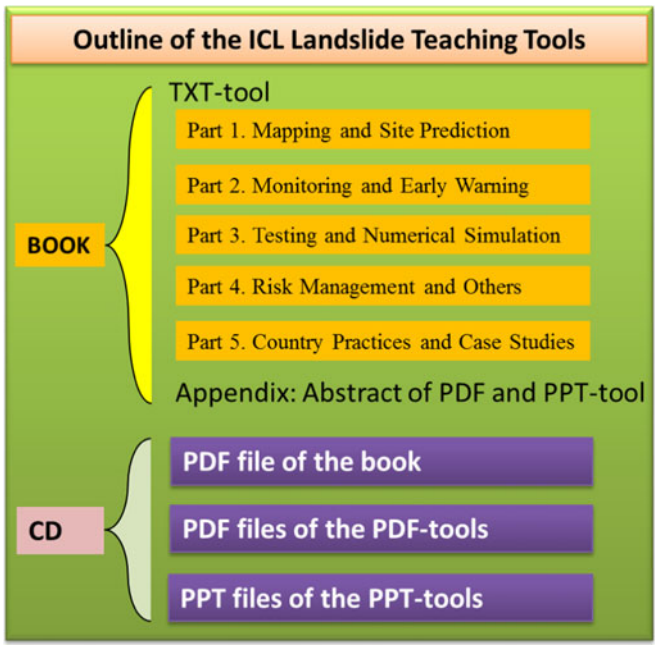

Fig. 2 Outline of the ICL landslide teaching tools

Table 1 shows the contents of the text book, and Table 2 shows the contents of the PDF and PPT tools.

Identifiers used for each tool

The identifier of each tool consists of three parts:

1. The number of the part of the tool box in which it appears (Parts 1 to 5);
2. The country telephone code and an assigned unique number for each contributing organization (for example, 081-1 signifies Japan-ICL headquarters, and 081-3 signifies Japan Erosion and Sediment Control Department, Ministry of Land, Infrastructure, Transport and Tourism);
3. The last part of the identifier is a consecutive number assigned to the teaching tool by its contributing organization.

Brief description of the example teaching tools

TXT-tool 1.886-1.1 Landslide susceptibility mapping

This appears in Part 1, contributed from Chinese Taipei (886), by the National Taiwan University (1), and is their TXT-tool number 1. This tool is a six-page article which used GIS as a tool to map storm-induced landslides from SPOT5 images. The concept, detailed workflow, sample results, and result application are presented.

PDF-tool 3.081-1.2 Manual of integrated computer simulation program "LS-RAPID"

This appears in Part 3, contributed from Japan (081), by ICL headquarters, and is their PDF-tool number 2. The one-page abstract is published in the book for a brief introduction of the manual for the LS-RAPID software. The detailed description of the manual is included in the accompanying CD as .pdf files. As for this tool, it includes five PDFs in the CD such as:

1. The basic operation guide using a simple slope;
2. A simulation example 1—the Leyte landslide simulation;
3. A simulation example 2—the hypothesis on Senoumi submarine landslide simulation;
4. A simulation example 3—the Grohovo (Croatia) landslide simulation;
5. A simulation example 4—the Kostanjek (Croatia) landslide simulation.

PPT-tool 4.039-1.1 Definition and use of empirical rainfall thresholds for possible landslide occurrence

This appears in Part 4, contributed from Italy (039), by the National Research Council CNR-IRPI, and is their PPT-tool number 1. The one-page abstract of this tool is published in the book. The PPT file is included in the CD. All the PPT files are formatted using the same style. The tool number, authors' email address, and slide number are added in the PPT files, which will be convenient for users to be used in their lectures.

Table 1 Contents of the book

Part 1. Mapping and site prediction		Authors
TXT-tool 1.081-2.1	Landslide topography mapping through aerial photo interpretation	Toyohiko Miyagi
TXT-tool 1.081-2.2	Interpreting topography from a historical perspective—A case study of a tropical deeply weathered region	Hiromu Daimaru
TXT-tool 1.081-2.3	Abstracting unstable slopes (landslide topography) using aerial photos and topographic maps: concept and frameworks	Eisaku Hamasaki Toyohiko Miyagi
TXT-tool 1.081-2.4	Risk evaluation using the analytic hierarchy process (AHP)—introduction to the process concept	Eisaku Hamasaki Toyohiko Miyagi
TXT-tool 1.886-1.1	Landslide susceptibility map	Chin-Tung Cheng Chuen-Ming Huang et al.
TXT-tool 1.886-1.2	Potential debris flow torrent investigation methods	Chjeng-Lung Shieh
Part 2. Monitoring and early warning		
TXT-tool 2.062-1.1	A landslide monitoring and early warning system	Teuku Faisal Fathani Dwikorita Karnawati
TXT-tool 2.062-1.2	A monitoring and early warning system for debris flows in rivers on volcanoes	Teuku Faisal Fathani Djoko Legono
TXT-tool 2.081-1.1	Key points in field work for landslide engineers	Shinro Abe Masao Yamada et al.
TXT-tool 2.385-1.1	Landslide comprehensive monitoring system: the Grohovo landslide case study, Croatia	Željko Arbanas Snježana Mihalić Arbanas
TXT-tool 2.385-1.2	A comprehensive landslide monitoring system: the Kostanjek landslide, Croatia	Snježana Mihalić Arbanas Željko Arbanas et al.
TXT-tool 2.886-1.1	Guidelines for landslide monitoring systems	An-Bin Huang
TXT-tool 2.886-1.2	Debris flow monitoring guidelines	Hsiao-Yuan Yin Yi-Min Huang
TXT-tool 2.886-1.3	Early warning criteria for debris flows and their application in Taiwan	Chyan-Deng Jan Feng-Hao Kuo et al.
Part 3. Testing and numerical simulation		
TXT-tool 3.081-1.1	Landslide initiation mechanism	Kyoji Sassa and Bin He
TXT-tool 3.081-1.2	Landslide dynamics	Kyoji Sassa and Bin He
TXT-tool 3.886-1.1	Introduction to debris 2D—a debris flow simulation program	Ko-Fei Liu and Ying-Hsin Wu
Part 4. Risk management and others		
TXT-tool 4.062-1.1	A socio-technical approach for landslide mitigation and risk reduction	Dwikorita Karnawati Teuku Faisal Fathani et al.
TXT-tool 4.062-1.2	Community hazard maps for landslide risk reduction	Dwikorita Karnawati Teuku Faisal Fathani et al.
TXT-tool 4.066-1.1	Community-based landslide risk management approaches	Asian Disaster Preparedness Center (ADPC)
TXT-tool 4.084-1.1	Soil slope stability analysis	Do Minh Duc
TXT-tool 4.886-1.1	Taiwan typhoon loss assessment system (TLAS) Taiwan web tool	Hsin-Chi Li and Yi-Chen Chen
TXT-tool 4.886-1.2	Emergency post-landslide disaster documentation	Lien-Kuang Chen

Table 1 (continued)

Part 5. Country practices and case studies		
TXT-tool 5.084-1.1	Landslide vulnerability assessment: a case study of Backan Town, Northeast Vietnam	Do Minh Duc, Mai Trong Nhuan et al.
TXT-tool 5.886-1.1	Procedures for constructing disaster evacuation maps: guidelines and standards	Su-Chin Chen and Lien-Kuang Chen
TXT-tool 5.886-1.2	Ecological countermeasure guidelines and case histories in Taiwan	Chia-Chun Ho and Jen-Yang Lin
Appendix: Abstract of PDF tool and PPT tools		

Usage and application of tools

In order to effectively use these teaching tools, strong regional and thematic networks for landslide risk reduction are very important. Strong networks are also necessary if ICL is to broaden its scope and societal impact in a thematic, institutional, and geographic manner and enhance international cooperation and capitalize on synergies with other international organizations and programs. ICL has initiated nine networks which are developing into strong, effective networks.

Table 2 Contents of the PDF and PPT tools

Part 1. Mapping and site prediction		
PDF-tool 1.064-1.1	Field guide for the identification and assessment of landslide and erosion features and hazards affecting pipelines (88 pages)	Chris Massey, Graham Hancox et al.
PPT-tool 1.039-1.1	Remote sensing data and methodology for event landslide recognition and mapping (30 pages)	Alessandro Mondini
PPT-tool 1.064-1.1	Landslides in New Zealand—identifying the hazard (50 pages)	Nick Perrin
PPT-tool 1.064-1.2	Earthquake-induced landslides in New Zealand (40 pages)	Graham Hancox
PPT-tool 1.064-1.3	Probabilistic landslide hazard, North Island, New Zealand (54 pages)	G.D. Dellow
PPT-tool 1.886-1.1	Construct a landslide susceptibility map (54 pages)	Chen-Tung Cheng, Chuen-Ming Huang et al.
PPT-tool 1.886-1.2	Potential debris flow torrent investigation method (41 pages)	Chjeng-Lun Shieh
Part 2. Monitoring and early warning		
PDF-tool 2.091-1.1	Status of landslide monitoring in India (10 pages)	Surya Parkash
PPT-tool 2.039-1.1	Italian national landslide warning system (29 pages)	Mauro Rossi, Ivan Marchesini et al.
PPT-tool 2.062-1.1	Landslide monitoring and early warning system (31 pages)	Teuku Faisal Fathani and Dwikorita Karnawati
PPT-tool 2.062-1.2	Monitoring and early warning system for debris flows in rivers on volcanoes (37 pages)	Teuku Faisal Fathani and Djoko Legono
PPT-tool 2.886-1.1	Landslide monitoring system guidelines (39 pages)	An-Bin Huang
Part 3. Testing and numerical simulation		
PDF-tool 3.081-1.1	Manual for ICL-1—a transportable ring shear apparatus (46 pages)	Maja Ostric and Kyoji Sassa
PDF-tool 3.081-1.2	Manual for the LS-RAPID software (43 pages)	Kyoji Sassa and Osamu Nagai

Table 2 (continued)

PDF-tool 3.081-1.3	Undrained dynamic-loading ring shear apparatus and its application to landslide dynamics (13 pages)	Kyoji Sassa and Hiroshi Fukuoka
PDF-tool 3.081-1.4	Dynamic properties of earthquake-induced large-scale rapid landslides within past landslide masses (10 pages)	Kyoji Sassa
PDF-tool 3.081-1.5	An integrated model simulating the initiation and motion of earthquake and rain induced rapid landslides and its application to the 2006 Leyte landslide (18 pages)	Kyoji Sassa
PDF-tool 3.081-1.6	A hypothesis of the Senoumi submarine megaslide in Suruga Bay in Japan—based on the undrained dynamic-loading ring shear tests and computer simulation (17 pages)	Kyoji Sassa and Bin He
PPT-tool 3.039-1.1	Landslide hazards and risk assessment (52 pages)	Fausto Guzzetti
PPT-tool 3.039-1.2	Probabilistic approach to physically based landslide modeling (29 pages)	Massimiliano Alvioli and Mauro Rossi
PPT-tool 3.039-1.3	Landslide-related WPS services (46 pages)	Ivan Marchesini
PPT-tool 3.039-1.4	Advanced 2D slope stability analysis by LEM by SSAP software: a full freeware tool for teaching and scientific community (52 pages)	Lorenzo Borselli
PPT-tool 3.064-1.1	Numerical analysis of slopes (53 pages)	Chris Massey and Simon Nelis
PPT-tool 3.886-1.1	Debris-2D tutorial (43 pages)	Ko-Fei Liu and Ying-Hsin Wu
Part 4. Risk management and others		
PDF-tool 4.091-1.1	Guidelines for landslides management in India (190 pages)	Surya Parkash
PDF-tool 4.091-1.2	Training module on comprehensive landslide risk management (304 pages).	Surya Parkash
PDF-tool 4.091-1.3	Community-based landslide risk reduction (24 pages)	Surya Parkash
PPT-tool 4.039-1.1	Definition and use of empirical rainfall thresholds for possible landslide occurrence (39 pages)	Maria Teresa Brunetti and Silvia Peruccacci
PPT-tool 4.039-1.2	Landslide risk to the population of Italy (37 pages)	Paola Salvati and Cinzia Bianchi
PPT-tool 4.062-1.1	Socio-technical approach for landslide mitigation and risk reduction (10 pages)	Dwikorita Karnawati, T.Faisal Fathani et al.
PPT-tool 4.062-1.2	Community hazard maps for landslide risk reduction (10 pages)	Dwikorita Karnawati, T.Faisal Fathani et al.
PPT-tool 4.064-1.1	Case history: the 1979 Abbotsford landslide, Dunedin, New Zealand (37 pages)	Graham Hancox
PPT-tool 4.064-1.2	Qualitative landslide risk assessment in New Zealand (30 pages)	Graham T. Hancox
PPT-tool 4.064-1.3	Quantitative landslide risk assessment in New Zealand (30 pages)	Mauri McSaveney
PPT-tool 4.064-1.4	Three recent GNS science landslide responses (28 pages)	Mauri McSaveney
PPT-tool 4.064-1.5	Case study—Utiku landslide, Central North Island, New Zealand (27 pages)	Chris Massey and Stuart Read
PPT-tool 4.064-1.6	What are landslides in New Zealand? (36 pages)	Stuart Read
PPT-tool 4.064-1.7	Quantifying the benefits for floodplain management of targeted reforestation of landslide-prone terrain in New Zealand (23 pages)	Mike Page

Table 2 (continued)

PPT-tool 4.066-1.1	Course on landslide disaster risk reduction for local government level stakeholders (416 pages)	Asian Disaster Preparedness Center (ADPC)
PPT-tool 4.886-1.1	Typhoon loss assessment system (TLAS) Taiwan web tool (8 pages)	Hsin-Chi Li, Yi-Chen Chen et al.
PPT-tool 4.886-1.2	Assessment social impact of debris flow disaster by social vulnerability index (17 pages)	Ko-Fei Liu, Hsin-Chi Li et al.
Part 5. Country practices and case studies		
PDF-tool 5.001-1.1	The landslide handbook: a guide to understanding landslides (60 pages)	Lynn Highland and Peter Bobrowsky
PDF-tool 5.064-1.1	Guidelines for assessing planning policy and consent requirements for landslide-prone land (78 pages)	Wendy Saunders and Phillip J. Glassey
PDF-tool 5.064-1.2	Shut happens—building hazard resilience for businesses in NZ (9 pages)	Resilient Organisations
PDF-tool 5.064-1.3	Working from the same page consistent messages for CDEM: part B: hazard-specific information—landslides (14 pages)	Ministry of Civil Defence & Emergency Management, NZ
PDF-tool 5.081-3.1	Japanese laws, codes, guideline and standard procedure regarding to disaster prevention and risk reduction in Japan (874 pages)	Erosion and Sediment Control Department, MLIT, Japan
PPT-tool 5.886-1.1	Tutorial: procedures for constructing disaster evacuation maps (56 pages)	Su-Chin Chen and Lien-Kuang Chen

Thematic networks

1. Capacity development network
2. Landslide risk management network
3. Landslides in cold regions
4. Landslides and cultural & natural heritage network
5. Landslide monitoring and warning network

Regional networks

1. Adriatic–Balkan network
2. North-east Asian network
3. Latin American network
4. South-east Asian network

ICL requests cooperation with these networks and their activities. One of the key activities for the networks is capacity development using the landslide teaching tools. Any entities and individuals involved in mitigating landslide disasters are cordially invited to join in these new initiatives of ICL to create regional networks and teaching tools.

Version update and future direction

The initial ICL landslide teaching tools are introduced in this article. The TXT tools, PDF tools, and PPT tools are explained, respectively. The first edition of the teaching toolbox will be circulated to ICL members and ICL supporting members as well as the contributing organizations listed below. ICL will call for modifications, updates, and new contributions from members. The further improvement will be done based on this with the contribution from all members of the ICL networks. During the ICL Board of Representative meetings on 18–22 November 2013, an update of the first edition will be discussed. A second edition of the toolbox is planned for presentation at the World Landslide Forum 3 on 2–6 June 2014 in Beijing, China. Those who are willing to contribute to ICL teaching toolbox are invited to attend the side event of WLF3 "D2 Landslide teaching tools" to be held in the lunchtime session (12:30–14:00) on 6 June 2014 at the Beijing National Convention Center, Beijing, China.

Acknowledgments

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Related Disaster Risk Management for Society and the Environment" implemented by UNESCO, Kyoto University, and ICL.

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