



Claudio Margottini  
Paolo Canuti · Kyoji Sassa  
*Editors*

# Landslide Science and Practice

Volume 6  
Risk Assessment, Management  
and Mitigation



 Springer



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Volume 6: Risk Assessment, Management  
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## Preface

# Landslide Science and Practice

## Proceedings of the Second World Landslide Forum

The Second World Landslide Forum (**WLF**) was organized at the headquarters of the Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, on 3–9 October 2011. WLF is a triennial mainstream conference of the International Programme on Landslides (**IPL**) which is jointly managed by the IPL Global Promotion Committee consisting of the International Consortium on Landslides (**ICL**), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Meteorological Organization (WMO), the Food and Agriculture Organization of the United Nations (FAO), the United Nations International Strategy for Disaster Risk Reduction (UNISDR), the United Nations University (UNU), the International Council for Science (ICSU), and the World Federation of Engineering Organizations (WFEO).

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### Background to the World Landslide Forums

The International Consortium on Landslides (ICL) was established by the 2002 Kyoto Declaration “Establishment of an International Consortium on Landslides,” with the Statutes adopted in January 2002. The Statutes defined the **General Assembly** of ICL: In order to report and disseminate the activities and achievements of the consortium, a General Assembly shall be convened every 3 years by inviting Members of the International Consortium on Landslides, individual members within those organizations, and all levels of cooperating organizations and individual researchers, engineers, and administrators. The General Assembly will receive reports on Consortium activities and provide a forum for open discussion and new initiatives from all participants.

### The First General Assembly 2005 to the First World Landslide Forum 2008

The First General Assembly was organized at the Keck Center of the National Academy of Sciences in Washington D.C., USA, on 12–14 October 2005. At this Assembly, the first full-color book reporting consortium activities for the initial 3 years, 2002–2005, was published as “Landslides-Risk analysis and sustainable disaster management” through Springer. The 2006 Tokyo Round-Table Discussion – “Strengthening Research and Learning on Earth System Risk Analysis and Sustainable Disaster Management within UN-ISDR as Regards Landslides” – toward a dynamic global network of the International Programme on Landslides (IPL) was held at the United Nations University, Tokyo, on 18–20 January 2006. **The 2006 Tokyo**

**Action Plan – Strengthening research and learning on landslides and related earth system disasters for global risk preparedness** – was adopted. The Tokyo Action Plan established a new global International Programme on Landslides (IPL) including holding World Landslide Forums. Accordingly, the Second General Assembly 2008 was replaced by the **First World Landslide Forum** and held at the United Nations University, Tokyo, Japan, on 18–21 November 2008.

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## Report of the Second World Landslide Forum

The Second World Landslide Forum – *Putting Science into Practice* – was organized at the Headquarters of the Food and Agriculture Organization of the United Nations (FAO) on 3–9 October 2011. It was jointly organized by the IPL Global Promotion Committee (ICL, UNESCO, WMO, FAO, UNISDR, UNU, ICSU, WFEO) and two ICL members in Italy: the Italian Institute for Environmental Protection and Research (ISPRA) and the Earth Science Department of the University of Florence with support from the Government of Italy and many Italian landslide-related organizations.

- 864 people from 63 countries participated. Attendance was larger than expected, and twice the attendance at the First World Landslide Forum 2008 in Tokyo (430 participants: 175 from Japan and 255 from abroad).
- 25 technical sessions were held, and 465 full papers were submitted. All accepted papers were edited in 7 volumes including this volume:
  1. Landslide Inventory and Susceptibility and Hazard Zoning
  2. Early Warning, Instrumentation and Monitoring
  3. Spatial Analysis and Modeling
  4. Global Environmental Change
  5. Complex Environment
  6. **Risk Assessment, Management and Mitigation – this volume**
  7. Social and Economic Impact and Policies

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## Requests of Cooperation for Further Development of ICL and IPL

ICL and IPL are global multidisciplinary and cross-sectoral initiatives to promote landslide science and capacity-development to reduce landslide disasters. The core activities of ICL and IPL are *Landslides: Journal of International Consortium on Landslides*, World Landslide Forum, and IPL projects. Thanks to worldwide support of the journal, the Impact Factor of *Landslides* was 2.216 for 2011 which is the highest within 30 ISI journals in category of Engineering, Geological. The journal will develop from a quarterly journal to a bimonthly journal from Vol. 10 in 2013. The Third World Landslide Forum – Landslide risk mitigation toward a safer geo-environment – at the China National Convention Center, Beijing, China, on 2–6 June (conference) and 7–11 June (Field Trip) 2014. The ICL entered into the second decade of its activities and organized a 10th anniversary Conference on 17–20 January 2012, in Kyoto, Japan. ICL adopted the ICL Strategic Plan 2012–2021, *To create a safer geo-environment* as an outcome of this conference.

ICL is an international nongovernmental and nonprofit scientific organization promoting landslide research and capacity-building for the benefit of society and the environment, and is



the thematic landslides platform in the UNISDR Global Platform for Disaster Risk Reduction. ICL activities are supported by voluntary efforts of ICL members and supporting organizations. All people involving in landslide research and landslide disaster mitigation activities are requested to cooperate for the development of this initiative through its second decade 2012–2021. (<http://www.iplhq.org/> and <http://icl.iplhq.org/>).

We are deeply appreciative of all the Second World Landslide Forum participants and of the contributions from our UNESCO, WMO, FAO, UNISDR, UNU, ICSU, WFEO partners and all of our colleagues in ICL for the development of IPL up to now. Finally we address our sincere thanks to Filippo Catani and Alessandro Trigila (the associate editors) for their extensive efforts covering the technical sessions, and reviewing and editing the papers.

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Forum Chair



Paolo Canuti  
President of ICL



Kyoji Sassa  
Executive Director of ICL



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# Organizational Structure of the Second World Landslide Forum

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## Organizers

IPL Global Promotion Committee including:

- International Consortium on Landslides (ICL) \*
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- World Meteorological Organization (WMO)
- Food and Agriculture Organization of the United Nations (FAO)
- United Nations International Strategy for Disaster Risk Reduction (UNISDR)
- United Nations University (UNU)
- International Council for Science (ICSU)
- World Federation of Engineering Organizations (WFEO)
- Italian Institute for Environmental Protection and Research (ISPRA)

(\* Members are listed in the last page of this book)

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## Co-sponsors

- International Union of Geological Sciences (IUGS)
- International Union of Geodesy and Geophysics (IUGG)
- International Geographical Union (IGU)
- International Flood Initiative (IFI)

## Under the Auspices of

- International Association for Engineering Geology and the Environment, Italian Section (IAEG)
- Italian Association of Engineering Geologists (AIGA)
- Italian Association of Geotechnique (AGI)
- Italian Association for Mining Engineers, Environment and Territory (ANIM)
- Italian Georesources and Environment Association (GEAM)

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- Irina BOKOVA (UNESCO Director-General)
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- Jacques DIOUF (FAO Director-General)

- Michel JARRAUD (WMO Secretary-General)
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