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**Security and resilience — Emergency  
management — Guidelines for  
implementation of a community-  
based landslide early warning system**

*Sécurité et résilience — Gestion des urgences — Lignes directrices  
pour la mise en oeuvre d'un système d'alerte locale immédiat de  
glissement de terrain*





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# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Landslide early warning system</b> .....	<b>2</b>
4.1 General .....	2
4.2 Risk assessment .....	2
4.3 Dissemination and communication of knowledge .....	3
4.4 Establishment of a disaster preparedness team .....	3
4.5 Development of an evacuation map and routes .....	4
4.6 Development of standard operating procedures .....	4
4.7 Monitoring, early warning and evacuation drill .....	5
4.8 Commitment of the local authority and community on the sustainability of the LEWS .....	6
<b>Annex A (informative) Example of the proposed community disaster preparedness team</b> .....	<b>7</b>
<b>Annex B (informative) Example of the layout of the evacuation map and route</b> .....	<b>8</b>
<b>Annex C (informative) Example of evacuation map and route</b> .....	<b>9</b>
<b>Annex D (informative) Example of symbols in the evacuation map and route</b> .....	<b>10</b>
<b>Annex E (informative) Example of the scheme of a community-based LEWS</b> .....	<b>11</b>
<b>Annex F (informative) Example of the flow of warning information and evacuation command</b> .....	<b>12</b>
<b>Annex G (informative) Example of evacuation SOP</b> .....	<b>13</b>
<b>Bibliography</b> .....	<b>15</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 292, *Security and resilience*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Landslides are one of the most widespread and commonly occurring natural hazards. Landslides may occur in different types of topographic and geologic settings. The occurrence of landslides may increase significantly due to uncontrolled land use development and human interference into unstable slopes. In many countries, landslides cause substantial socio-economical losses.

Landslide mitigation can be carried out both by structural and non-structural efforts. Structural mitigation includes adjustment of slope geometry, slope reinforcement, and protection and improvement of drainage systems, all of which require a high cost. The alternative option of relocation is not practical for residents living in areas prone to landslides. As a result, the most effective disaster risk reduction can be achieved by non-structural mitigation through improvement of the community's preparedness by implementing an early warning system.

The goal of the development of a community-based early warning system is to empower individuals and communities who are vulnerable to hazards to act in sufficient time and in appropriate ways to reduce the possibility of injury, loss of life and damage to property and the environment. The implementation of a community-based early warning system is consistent with the Sendai Framework for Disaster Risk Reduction of 2015–2030<sup>[14]</sup>. The fourth priority of the framework emphasizes the improvement of preparedness in order to respond effectively to a disaster, by implementing an early warning system and improving the dissemination of information about early warning of natural disasters at local, national, regional and international levels.

According to UN-ISDR<sup>[15]</sup>, a complete and effective early warning system consists of four interrelated key elements:

- a) risk knowledge;
- b) monitoring and warning service;
- c) dissemination and communication;
- d) response capability.

The implementation of a community-based early warning system takes into account the correlation between a strong bond and effective communication channels among all of these elements.

Demographic, social, economic and cultural aspects are most often left out in the implementation of early warning systems, compared to other technical aspects. Early warning system guidelines promote the role of the community and social aspects in general. Efforts to train people to respond to the warnings should be followed up by experts/researchers and by decision-makers at local and national levels.

By referring to the four key elements of community-based early warning system, this document for a landslide early warning system promotes uniformity in the development and implementation of early warning systems and will improve the preparedness of the communities vulnerable to landslides.



# Security and resilience — Emergency management — Guidelines for implementation of a community-based landslide early warning system

## 1 Scope

This document gives guidelines for a landslide early warning system. It provides a definition, aims to improve understanding, describes methods and procedures to be implemented, and gives examples of types of activities.

It is applicable to communities vulnerable to landslides, without taking secondary effects into consideration.

It recognizes population behaviour response planning as a key part of the preparedness.

It takes into account the approach of ISO 22315 and provides additional specifications for landslides.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 22300, *Security and resilience — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22300 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### **mass movement**

displacement of materials such as soil, rock, mud, snow or a combination of matter down a slope under the influence of gravity

### 3.2

#### **landslide**

wide variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill or a combination of these

### 3.3

#### **community vulnerability**

characteristics and conditions of individuals, groups or infrastructures that put them at risk for the destructive effects of a hazard

### 3.4

#### **early warning**

provision of information through local networks, allowing affected individuals to take action to avoid or reduce risks and to prepare responses