

Landslide susceptibility assessment over Europe according to the “Tier 1” approach: Experiment and perspectives

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Background: “Tier 1” approach

“Tiers” in risk area identification as indicated by SIWG
(to be applied for soil threats subject to spatial assessment)

Tier	Description	Characteristics
Tier 1	Risk area identification	<ul style="list-style-type: none">-Data must be available-Low spatial resolution (1:1 Mil.)-Qualitative approach, or Model approach combined with thresholds
Tier 2	Measures/implementation plans within the risk zones	<ul style="list-style-type: none">-Higher spatial resolution-Any approach (or combinations)-Enhanced data need to allow model application

Eckelmann et al., 2006

Background: “Tier 1” approach

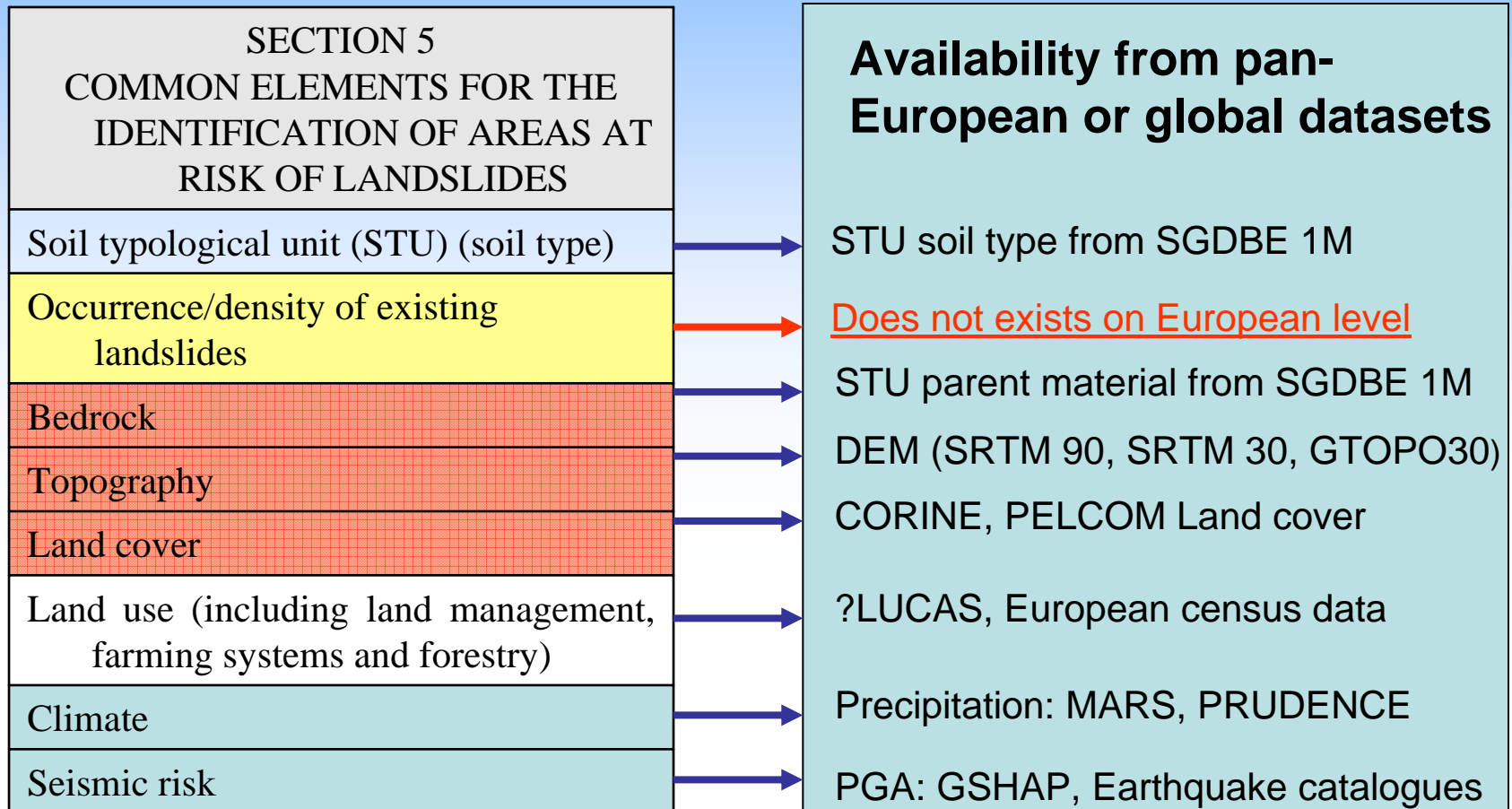
General specifications for “Tier 1” as formulated by the Landslides Working Group

- “Tier 1” to be carried out for the whole of Europe
- Small scale (~ 1:Million), mapping unit: 1 km grid cell
- Use of a reduced, common set of data as conditioning factors already available for the whole of Europe: **lithology**, **slope**, and **land cover**
- Application of a qualitative heuristic indexing approach for landslide susceptibility assessment
- Validation and calibration using representative inventory data for the main geological, geomorphological and environmental scenarios in Europe

Hervás et al., 2008

Background: "Tier 1" approach

Common elements proposed in Annex 1 of the draft of the directive



DIRECTIVE COM(2006) 232 establishing a framework for the protection of soil and amending

Directive 2004/35/EC

Experts meeting on harmonized landslide susceptibility mapping for Europe
JRC Ispra, 26-27 May 2010

“Tier 1” experiment: Susceptibility map preparation

Conceptual workflow:

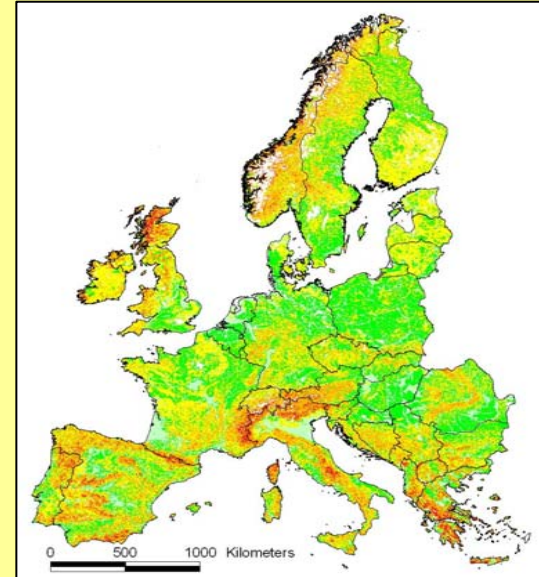
- Organization and rasterizing (1 km grid cell) of three EU-wide data: lithology, slope, land cover
- Preparation of three susceptibility maps for lithology, slope, land cover through subjective (expert) classification of the input data into five susceptibility levels
- Susceptibility map combination
- Normalization of the combined susceptibility estimate and slicing into five equal-interval susceptibility levels

“Tier 1” experiment: Data and classification

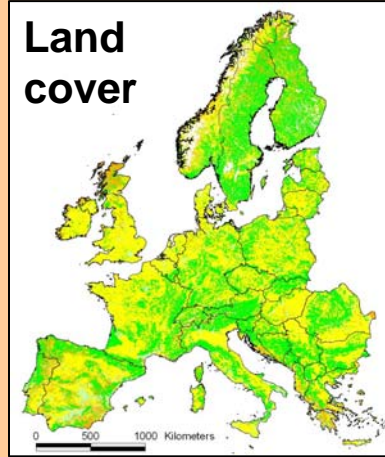
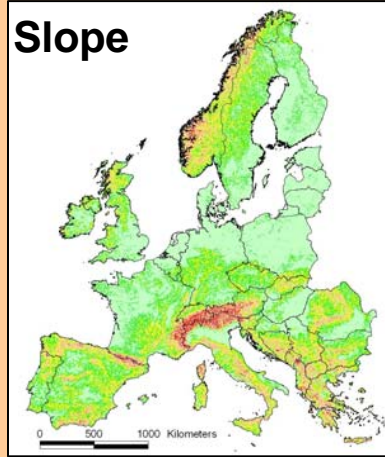
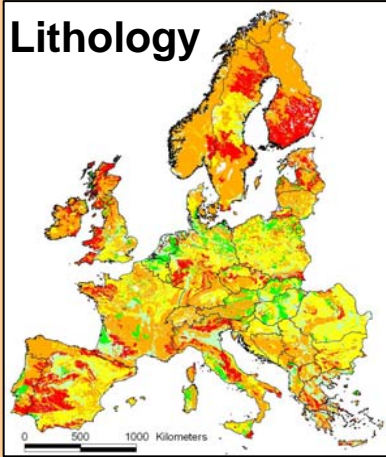
Data



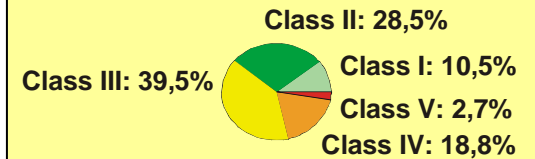
Susceptibility map



Susceptibility classification



Expert-based parameter combination



Area percent of Susceptibility classes

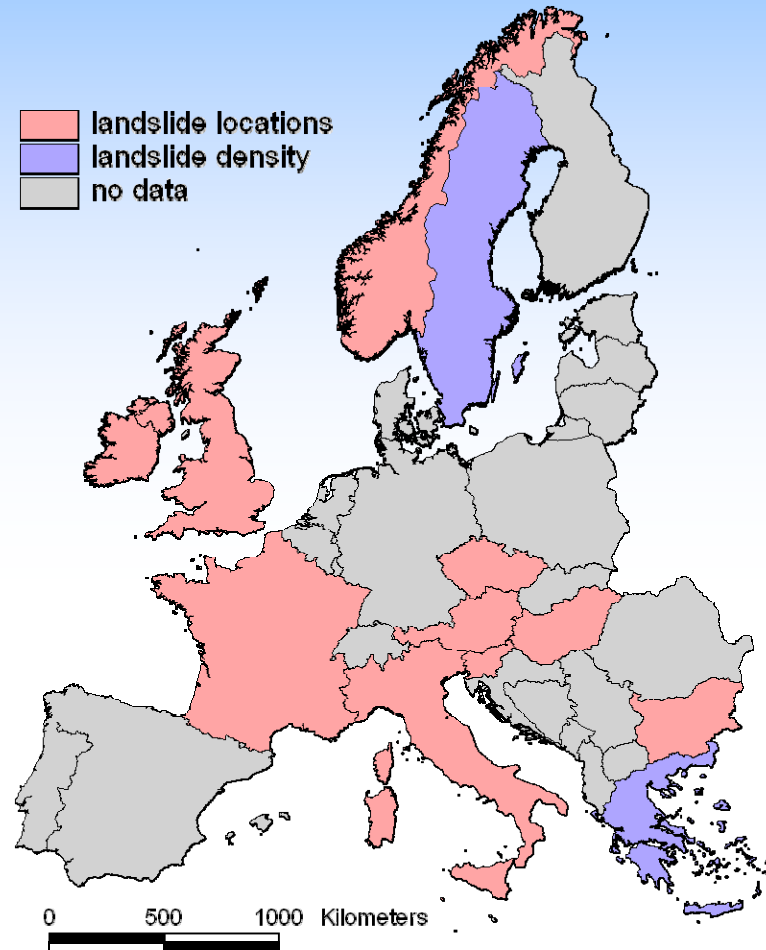
“Tier 1” experiment: Calibration and evaluation

Conceptual workflow:

- Gathering of national landslide location information for European countries where this data is available
- Calculation of bivariate information values for **national** input data parameter classes for EU countries with landslide information
- Calculation of **global** parameter class information values for EU countries without landslide information (data gaps) using total landslide inventory
- Spatial merging of national- and EU wide calibrated conditioning factor data, summation of information values on 1 km grid cell
- Classification of merged susceptibility estimate through success-rate evaluation into five classes containing 50%, 25%, 14%, 8%, 3% of landslides

“Tier 1” experiment: Landslide information

European countries with landslide Information on a national level



***“Tier 1”*: Perspectives**

- Conditioning factor data: Experimental data should be replaced by higher quality available information
- Landslide information: More information on landslide locations to be used at the 1:1 Mil. scale should be collected
- Triggering factor data: Data on seismicity and climate should be incorporated for higher level susceptibility mapping
- Calibration: Model calibration should be done for main geomorphological /climatographical regions of Europe and extrapolated over areas without landslide information