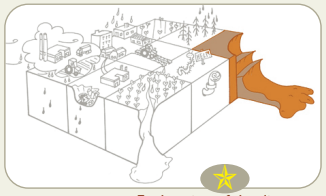
Landslides

Mass movements...



Explanation of the diagram "The magic of soil" sheet

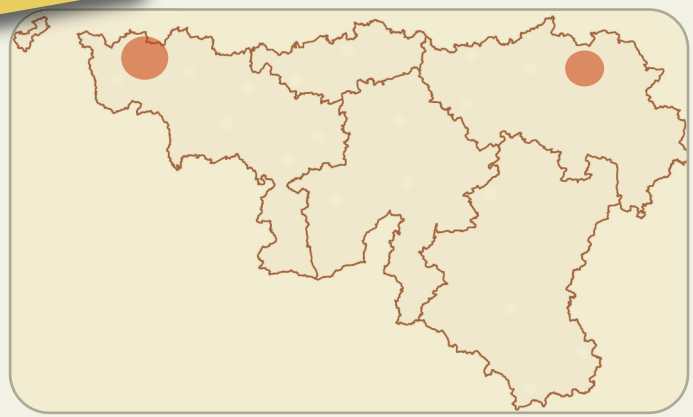
In Wallonia, the only areas affected by landslides, i.e. **mass movements of loose rocks down sloping land, are the Herve area (north-east) and the Collines region (north-west).**

The consequences may not be as disastrous as in other parts of the world, but landslides can nevertheless cause major damage to farming land, infrastructures and housing.

Studies have therefore been carried out in the affected regions and map produced. Strict standards govern the granting of building permits in these areas. Since 1997, the Code du Développement Territorial (CoDT (Territorial Development Code), formerly CWATUPE) has included landslides in the list of "geotechnical constraints" potentially influencing the development of land and granting of building permits.

In Wallonia

Landslide risk areas in Wallonia

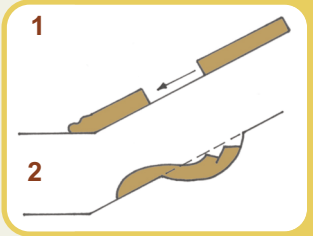


What is a landslide?

A landslide* is a movement, of varying speed, of loose earth or rocks (top layers of soil) down a slope. The thickness, volume and mass of this movement can vary: from a few cubic metres to... a few million!

A distinction is usually made between **two types of landslide**. In reality, they often occur in combination.

1. Slide down a flat surface
2. Slide down a concave surface or a "rotational" landslide.



In some cases, landslides can trigger secondary phenomena, with potentially devastating effects: mudslide, watercourse siltation, rock fall, for example.

*a landslide is a type of "mass movement". This description also includes compaction, rock falls and slumping, karstic collapse and other phenomena not covered here.

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What causes landslides?

Gravity!
Any mass located on a slope is dragged downwards by its own weight. Soil resists this downward pressure to a greater or lesser degree and the forces are balanced. If the pressure applied overcomes this resistance, the earth ruptures and a landslide occurs.

A very wide range of factors, which can occur in combination!

1 Water

- Water makes earth heavier, making it more likely to break away;
- It reduces resistance to abrasion: materials slide more easily;
- It alters the properties of certain materials (some clays swell);
- When water becomes "trapped" in soil, or when it seeps into cracks and gaps, it applies significant pressure.

2 The type of land

Some clay ("montmorillonite" types for example, such as "Herve smectite") have a high water-retention capacity: they swell when wet and contract in summer as they dry out. This swelling-shrinking movement works soil and causes relatively deep cracks to appear. This makes land more vulnerable, in particular earth located on a slope. Other materials with low consistency* (sand, non-swelling clay) are more likely to split and be carried down a slope when they are wet.

*consistency: cohesion between the particles that make up a material.

3 Land's geological structure

Geological structure–, in other words, the piling and organisation of subsoil layers, – plays a determining role in landslides. Alternating permeable and impermeable layers can cause water to become "trapped", or result in the formation of springs above the impermeable layers. This situation can be aggravated by steeply sloping subsoil layers, caused by earlier geological movements (folding).

4 Earthquakes

Earthquakes cause fractures to appear in both the subsoil and on the surface, as well as changes in ground levels.

5 Human activities

Alteration of a slope (excavation, construction), or an excessive load at the summit, a leak or burst pipe, and pumping of water can all increase landslide risk.

Two illustrations of landslides in Wallonia

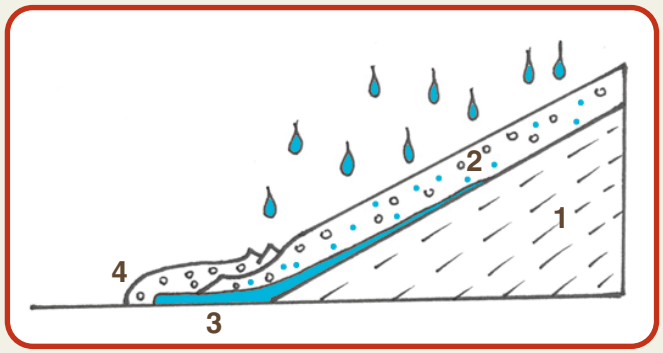
Collines region
(Mont-de-l'Enclus, Frasne-les-Anvaing)

1. An impermeable layer of various types of clay is covered by sandy deposits.

2. During heavy rain, the sand becomes saturated with water.

3. Springs appear on contact with the clay.

4. The sandy layer slides.



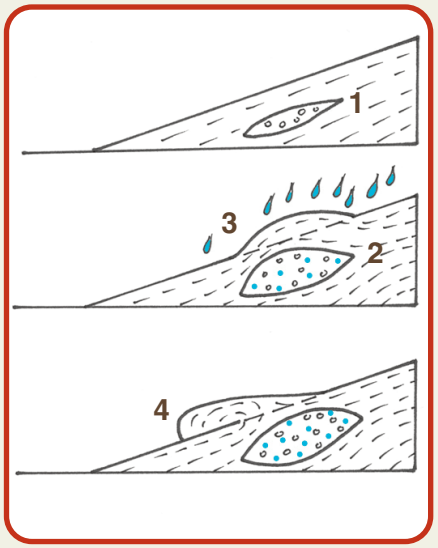
Herve area
(west of Herve)

1. The subsoil is made up of sandy clays containing sand lenses.

2. During heavy rain, water becomes trapped in these sand lenses.

3. The pressure from this trapped water causes the soil to suddenly lift up in places (known as "boiling")

4. A landslide occurs.



What can we do?

Seek advice

The best means of protection from landslides is to avoid building in risk areas. Local authorities in these areas have access to the full spectrum of information and studies carried out since the 1990s. Therefore, they are the only bodies capable of assessing the risks and imposing conditions for the issue of building permits, in accordance with the provisions of article 136 of the CWATUPE.

Bibliography

Landslides in Wallonia:

http://geologie.wallonie.be
(soil and subsoil issue)
http://environnement.wallonie.be

And also…

Les risques naturels en Région wallonne, - Prévenir en aménageant.
Les glissements de terrain en Wallonie, OZER, A. et al, Etudes et Documents (DGATLP), 7, 2006.

Photography credits

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