Anatomy of Nyakavogo landslide (Bukavu, DR Congo): interplay between natural and anthropogenic factors

Toussaint MUGARUKA BIBENTYO, Sylvain KULIMUSHI MATABARO, Walère MUHINDO SAHANI & Olivier DEWITTE

November, 17th 2017
Context

Western branch of the East African Rift

Peel et al., 2007. HESS

Smets et al., 2015. Earth-Science Reviews
Context

- Landslide-prone region
- Natural predisposition factors
- Combination of triggering factors
- Human pressure
- Data poor context
Regional inventory

- **1780 deep-seated landslides**
- Compiled from Google Earth
- The most harmonized information at the regional level
- Used for the regional susceptibility assessment
- Highlight of weathering (volcanic provinces)
Bukavu inventory

- 151 landslides
- 30% urban territory
- Relative age categories (geomorphological assessment)
- Process differentiation
- Few data on the interactions between human factors and landslide processes

Dewitte et al., in prep.
Anatomy of Nyakavogo landslide

- Study focusses on the analysis of the spatial and temporal variability of natural and anthropogenic factors
- 60 years of landslide history
Methodology

- Field inventory
- Google Earth
- Pléiades image and aerial photos
- Archives

Data processing

- Land use/cover
- History of instability
- Elements at risk

Natural and anthropogenic factors
In 1959

- An old landslide
- Trace of instability
- Forest dominates
From 1959 to 1997

- Significant reduction of forest
- Cropland - grassland
- Roads destroyed

Wafula et al., 2007
From 1997 to 2015

- Reforestation effort
- Stability of the main escarpment but landfilling of its northern part
- Activity at the foot of the landslide since 2000
The landslide exists but no information on its history

Traces of instability

Apparent stability

A: Densely forested slope
B: Forest progressively converted into crop- and grasslands
C: New houses and terraced parcels
D: Occupation of the slope by a refugee camp
E: Seismic shaking

Reactivation of most of the slide

Reactivation of the landslide foot

Activity at the foot of the slide

F: Spillage of ~9600 m³ of water in the landslide following the rupture of a water pipe
G: River dam
H: River dynamics
I: Exploitation of building materials in the river
J: Overloading of part of the main escarpment
Landslide distribution in a changing environment: focus on the Ruzizi gorges

- Frontier between Rwanda and DR Congo
- Highly affected by landslide processes
- Two (+1) hydroelectric dams
Merci pour votre attention