VRIJE UNIVERSITEIT BRUSSEL

UNIVERSITÉ LIBRE DE BRUXELLES

KONINKLIJK MUSEUM VOOR MIDDEN-AFRIKA MUSÉE ROYAL DE L'AFRIQUE CENTRALE — Africa TERVUREN

The Research Groups

Physical Geography of VUB
and
ANAGEO/IGEAT of ULB

have the honour to invite you to the public defence of the PhD thesis of

Caroline MICHELLIER

to obtain the degree of Doctor of Sciences.

Contribution to geo-risk prevention: population vulnerability assessment in a data scarcity context. Case studies of Goma and Bukavu cities (RD Congo)

It will take place on **Wednesday 13th September 2017 at 16h** in **Auditorium S.AY2.107** (building A, door Y, 2nd floor, room 107) at the Solbosch Campus, Av. F. Roosevelt 50 - 1050 Elsene/Ixelles, and will be followed by a reception.

This defense will be preceded by seminars of international jury members:
- **14:30 – Dr. Natalia DELIGNE – GNS, New Zealand**
- **15:15 - Prof. Patrick PIGEON – Université de Savoie, France**

Promotors : Eléonore WOLFF (Université Libre de Bruxelles)
Matthieu KERVYN DE MEERENDRÉ (Vrije Universiteit Brussel)

Co-Promotor : François KERVYN DE MEERENDRÉ (Musée Royal de l'Afrique Centrale/ Koninklijk Museum voor Midden-Afrika)

Members of the jury : Jean Michel DECROLY (ULB/IGEAT, chairman)
Fabio VANIN (VUB, secretaris/ secretary)
Marius GILBERT (ULB/LUBIES)
Théodore TREFON (MRAC)
Natalia DELIGNE (GNS)
Patrick PIGEON (Université de Savoie)

Abstract of the PhD research

GeoRisCA — Geo-Risk in Central Africa

In Democratic Republic of Congo (DRC), the densely populated provinces of North and South Kivu are exposed to several geohazards such as landslides, and the very active Nyiragongo and Nyamulagira Virunga volcanoes. Moreover, the region suffers from a poor economic level and recurrent conflicts that contribute to weaken the threatened population.

The present PhD research was developed as a contribution to the GeoRisCA project (Belspo, SSD program, SD/RI/02A; http://georisca.africamuseum.be), whose overall objective responds to the need to study geo-risks in the Kivu lake region, in order to support regional and local risk management. Specifically, this research aimed at assessing the vulnerability of a population facing geohazards in a data scarcity context.

The study was conducted in two urban sites: Bukavu, capital city of South Kivu, counts about 870,000 inhabitants, and is at risk of frequent mass movements; and Goma, capital city of North Kivu, groups about 775,000 persons endangered by the lava flows of the Nyiragongo volcano, whose last eruption dates from 2002. To fill in the lack of reliable data on population census and characteristics, a methodology adapted to the particular context and relying on remote sensing, quantitative surveys, in-depth interviews, and detailed knowledge of the studied area has been developed. Two baseline demographic databases were built-up – one for each studied city – merging individual and household variables. The surveyed population samples were then used to derive detailed population density maps and spatially analyze the socio-economic characteristics for both urban areas. A social vulnerability index was then elaborated from a Principal Component Analysis (PCA) of a wide range of selected socio-economic variables. An "operational" vulnerability index was then deduced from this social vulnerability index, in order to better reflect the local context and facilitate replicability of field work.

The final step of this study was to spatially combine the vulnerability assessment and the population density to the landslides susceptibility analysis and the probability of lava flow invasion developed by experts in the framework of the GeoRisCA project. The resulting risk maps are new decision-supporting tools; they were provided to local authorities and allow strengthening, on the one hand, risk reduction policies and disaster prevention programs, and on the other hand, urban planning perspectives. Finally, it is important to emphasize that this research could not have been carried out without a close partnership with the local scientific institutions and authorities, and has significantly contributed bridging the gap between these stakeholders.

Belgian Science Policy Office — belspo