Urban sprawling and rising risks: historical and future gully erosion evolution and its impacts in sub-Saharan African cities

Partners: Royal Museum of Central Africa & University of Liège (Belgium)

Period: December 2019 – December 2023

Urban gully in Kinshasa, Democratic Republic of Congo (Matthias Vanmaercke, May 2018).

The Royal Museum for Central Africa (RMCA) and the University of Liège (ULiège), Department of Geography seek applications for a PhD proposal on the study of gully erosion and its impacts in sub-Saharan African cities.

The research group GeoRisKA of the Royal Museum for Central Africa has its research activities in the fields of geology, geomorphology, natural hazards and risk assessment. Most of its study areas are located in Central Africa. Remote sensing, GIS, and field work are used to support the research as well as for assisting in thematic mapping. The involved research group at ULiège concentrates on understanding geomorphic processes and their impacts at regional to continental scales, with a strong focus on Africa.

The research topic deals with the issue urban mega-gullies. Such urban gullies affect dozens of cities in sub-Saharan Africa. They result from a combination of erosion-prone conditions, intensive rainfall and inadequate urban planning and are in many cases associated with significant impacts (including casualties, the destruction of houses and damage to infrastructure). Nonetheless, the controlling factors and impacts of this geomorphic hazard remains currently poorly understood.

The proposed research topic therefore aims to assess the total population in sub-Saharan cities that is currently impacted by this problem and to predict how this will evolve in the future. First, the PhD candidate will build multi-temporal inventories of urban gullies for affected cities across Africa and locate the impacted zones. Based on this, the candidate will then aim to better understand the natural and anthropogenic factors that lead to the formation and expansion of urban gullies. Finally, the current and future impacts on populations will be studied with regard to urban growth and climate change scenarios. The research will be mainly based on remote sensing, aerial photo interpretation, GIS analyses and empirical (statistical) modelling. In addition, short fieldwork campaign and terrain visits are foreseen (around 3 weeks/year). The PhD thesis will be prepared in English, based on a compilation of peer-reviewed scientific publications.

The candidate will work at RMCA under the supervision of Dr. Olivier Dewitte and Dr. Caroline Michellier and at the Department of Geography (ULiège) under the supervision of Prof Matthias Vanmaercke.

Expected responsibilities:
- Conduct the foreseen PhD research (data collection, analyses, fieldwork, …)
- Actively engage with the other PhD students and researchers at RMCA and ULiège
- Contribute to teaching activities organized at ULiège, Department of Geography
- Synthesize results of research in peer-reviewed journals
- (Helping with) supervising MSc theses
- Present results to academic and policy audiences in meetings, forums, workshops and conferences

Requirements:
- Having a Master or Engineering degree in the field of Geography, Geology, Bio-Science Engineering, or in a related discipline
- Having completed this degree with at least a distinction (cum laude)
- Experience with statistical analyses, GIS modelling and/or geospatial analysis. Having coding skills (in Python, R or similar computer languages) and/or expertise in the field of remote sensing is a strong advantage.
- Excellent communication skills in English – both orally and written
- Experience with field work in developing countries is an advantage
- Being able to work largely autonomously as well as in a team

Granting scheme:
A PhD proposal for the selected candidate will be submitted for peer-review 02nd September 2019 to BELSPO BRAIN-be 2.0 PhD fellowship schemes (PhD proposals within this funding scheme are nominative). The outcome of the evaluation will be known by end of October 2019. If successful, the PhD fellowship will be available from December 2019 onwards. While funding for this PhD project is not yet secured, the chances of success are considerably higher than for other Belgian fellowships.

Contract offer:
- A competitive 4-year full-time PhD scholarship (net salary of around 2000 EUR/month)
- Funding for field trips, participation to conference, etc. is provided

- Additional benefits such as health insurance, free travel to and from work by means of public transport or bicycle allowance, free bicycle use, access to university sports facilities, child care opportunities, ….
- The possibility to follow academic, thematic and skills training courses at ULiège
- A dynamic and multi-cultural work environment
- Participation in collaborative international research projects

Application instructions:

Interested candidates should submit an application by email, including a motivation letter and CV (in one stand-alone PDF file; email subject: "Urban Gully application"), no later than August 05th to both Dr. Olivier Dewitte (olivier.dewitte@africamuseum.be) and Prof. Matthias Vanmaercke (matthias.vanmaercke@uliege.be). Dr. Dewitte and Prof. Vanmaercke can also be contacted for any further information regarding this vacancy. Shortlisted candidates will be notified by August 08th and, depending on availabilities, interviewed around 12th August. If necessary, interviews will be conducted via Skype.

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