



Dr. Emmanuel Opolot  
**Lecturer / Soil Scientist**

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### Address

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### About/Introductory statement

Dr Emmanuel Opolot is a lecturer at the Department of Agricultural Production, College of Agricultural and Environmental Sciences, Makerere University, a Future Leader African Independent Research (FLAIR) Fellow (2020-20230 and an Affiliate Member of the African Academy of Sciences Cohort 6 (2021-2025). He holds a PhD degree in soil science from Ghent University (Belgium) and has so far (co) authored 16 publications in peer reviewed journals and book chapters, with over 200 citations and h-index of 8. Emmanuel is an accomplished soil scientist with strong analytical, creative and leadership skills. He has won already four research grants in the last four years: with the International Foundation for Science (IFS), the Makerere Research and Innovation Fund (MAK-RIF), the prestigious postdoctoral fellowship with the Future Leaders African Independent Research (FLAIR) and an innovation grant with the Ministry of Science Technology and Innovation, Uganda. Emmanuel's research has so far focused on integrated soil, water and nutrient management. His master thesis research evaluated efficiency of local soil water conservation practices and the results were used to improve the design of water conservation technologies in response to climate change. His PhD research integrated biogeochemical processes with climate and land use changes in a model to answer topical questions on how soils will respond to human disturbance and climate change. His current research as a FLAIR fellow is on digital soil mapping for improved soil, water and nutrient management in selected irrigation schemes in Uganda. He is also the internship coordinator of the School of Agricultural Sciences.

### Qualifications

**PhD** Ghent University, Geology and Soil science May 2016  
Dissertation: "Modelling soil evolution to assess soil system behaviour under global change"  
**Committee:**  
Prof. Dr. Stephen Louwye (Chair)  
Prof. Dr. Ir. Steven Sleutel (Secretary)  
Prof. Dr. Daniela Sauer  
Prof. Dr. Veerle Vanacker  
Prof. Dr. Geert Baert

- Em. Prof. Dr. Eric Van Ranst  
 Prof. Dr. Peter Finke (Supervisor)
- MSc** Free University of Brussels/Ghent University, Soil Science September 2012  
 Thesis: "Evaluating in situ Water and Soil Conservation practices with a fully coupled, surface/subsurface process-based hydrological model in Tigray, Ethiopia"  
 Advisor: Prof. Wim Cornelis
- BSc** Makerere University, Land Use and Management January 2009  
 Graduated with a first class degree (BSc. Agricultural Land Use and Management)

## Other Activities

- Lead Pedologist**, National Agricultural Research Laboratories, Kawanda Jan 2017- June 2018
- Successfully led the soil team in soil surveying and mapping to update the National Soils Map of Uganda.
- Capacity Development Trainer**, Somalia Disaster Resilience Institute (SDRI), Mogadishu July – August 2018
- Trained of 30 officials from the Ministry of Agriculture and Irrigation, Somalia, on soils, farm planning and food security
- Agricultural Land Use Specialist and Soil Scientist** – Yumbe and Moyo districts, Uganda September-November 2018
- Lead consultant with Palladium Uganda on Environmental Impact Assessment and Designing Environmental Mitigation Strategy for Land Clearance using Earth Moving Equipment in West Nile. Funded by DFID through NUT-EC (Northern Uganda – Transforming the Economy through Climate Smart Agri Business Market Development).
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## Teaching

**Makerere University**, Kampala, Uganda August 2017 to Present  
**Lecturer**, Department of Agricultural Production

- Taught Soil Conservation and Land Reclamation, an undergraduate semester 2 course to BSc. Agriculture and BSc. Land use and management, averaging 100 students per semester, covering the following topics: Principles of soil conservation and land reclamation, Soil conservation and land reclamation practices and techniques, Factors influencing application of soil conservation and land reclamation interventions and Soil conservation programs, legal and institutional support
- Taught Pedology and Land Use Potential, an undergraduate semester 1 course to BSc. Agriculture and BSc. Land use and management, averaging 100 students per semester, covering the following topics: Soil components, Chemical, Biological & Physical reactions and processes, Soil characteristics as a result of Chemical, Biological & Physical reactions and processes, Factors of soil formation, Introduction to soil classification, Soil map of Uganda and an Overview of soil types and their suitability and productivity levels
- Taught Soil Productivity Assessment and Management, an undergraduate semester 2 course to BSc. Land use and management, averaging 40 students per semester, covering the following topics: Soil fertility and soil productivity, Physical, chemical and biological factors influencing soil productivity, Soil productivity management, Soil productivity assessment, Gender and soil productivity management
- Taught Pedology and Geomorphology, a graduate semester 1 course to MSc. Soil Science, averaging 7 students per semester, covering the following topics: Soil components, Geomorphology and Pedology, Chemical & physical reactions and processes, Soil genetic processes and their effect on the soil, Factors of soil understanding, Soil classification, Soil mapping,

Soil of Uganda and Africa, Africa Soil Information System (AfSIS)

- Coordinated field practical exercises with a team of three lab technicians
- Developed quizzes, exams, and homework
- Revised the syllabus to meet accreditation standards

**Gulu University**, Gulu, Uganda

January 2017 to Aug 2017

**Lecturer**, Department of Agronomy

- Taught Land Use Planning and Land Evaluation, an undergraduate semester 1 course to BSc. Agriculture averaging 50 students per semester, covering the following topics: Introduction, Systems of Land Evaluation, Land evaluation under the FAO framework, Tools and Data sources for land Evaluation and, Soil Survey and Classification
- Taught Soil Fertility and Fertilizers, an undergraduate semester 1 course to BSc. Agriculture averaging 50 students per semester, covering the following topics: Concepts in Soil Fertility; Integrated Soil Fertility Management (ISFM), Biogeochemical Cycles, Fertilizer and Types, Issues in Fertilizer Use, Nutrient Use Efficiencies (NUE) and Soil pH and Soil Management

## Research

### **National Research and Innovation Program (NRIP) 2021-2022**

This research grant is supported by the Government of Uganda, through the Ministry of Science, Technology and Innovation. The objectives of the project: “Soil Moisture Sensing for improved Water Use Efficiencies and Crop productivity among micro-scale irrigation systems in Uganda” are (i) to introduce a system of IoT and soil moisture monitoring using sensors in irrigation scheduling, management and monitoring of irrigation system operations for increasing water use efficiency and productivity and (ii) develop a Smartphone based irrigation tool for automated irrigation scheduling in micro-scale irrigation systems for improved water use efficiencies and crop yields.

### **Future Leaders African Independent (FLAIR) Research Fellow 2020-2023**

This fellowship is supported by the Royal Society in collaboration with the African Academy of Sciences. This research aims at improving access to soil information by smallholder farmers for sustainable soil, water and nutrient management, and consequently increased crop yields and incomes. The main deliverables will include soil water budgets, irrigation scheduling charts, nutrient use efficiencies and fertilizer recommendations for five irrigation schemes in Uganda.

### **Research and Innovation Grant 2019-2020**

This research is funded by the Government of Uganda, in the framework of Makerere University Research and Innovation Grant (RIF). The overall objective of the proposed project is to upgrade and advance the use of rapid soil testing technologies for quick access and use of soil information for more accurate, affordable, and prompt soil, water and nutrient farm management decisions. The deliverables include digital soil database, updated, calibrated and validated Makerere University Soil Test Kit (MAK-STK) and a web-based platform and android app for easy access to soil management recommendations.

### **International Foundation for Science (IFS) research grant 2018-2020**

The main activities included (i) site characterization, soil profile description and soil classification, (ii) soil survey and mapping of soil morphological, physical and chemical properties and (iii) developing digital soil maps and crop suitability maps in a GIS

environment.

#### Research groups and Centres

[www.researchgate.net/profile/Emmanuel-Opolot](http://www.researchgate.net/profile/Emmanuel-Opolot)  
[www.paat-soilclinic.com/board-of-advisors/dr-emmanuel-opolot/](http://www.paat-soilclinic.com/board-of-advisors/dr-emmanuel-opolot/)  
Dr. Emmanuel Opolot – Software Development and E-learning Kampala | Eight Tech Consults Limited (8technologies.net)

#### Community based work

##### Lions Club International- Lions Club of Makerere

Service Chairperson (2022-2023): main activities include organizing community service activities, chairing service committee meetings, orientation and induction of new club members, participating in service activities including plant trees, donating food and other essentials, fundraising drives and health campaigns.

#### Awards or special recognitions received

- **Reviewer Certificate Award (21/01/2022):** in recognition of the reviews contributed to the grant application review process of the African Research Initiative for Scientific Excellence (ARISE)
- **Affiliate 2021-2025 (Cohort 6)** with the African Academy of Sciences (AAS): [www.aasciences.africa/affiliate/emmanuel-opolot](http://www.aasciences.africa/affiliate/emmanuel-opolot)
- **Certificate of Recognition**, by the School of Agricultural Sciences, Makerere University 2017-2018
- **De Boodt-Maselis prize (1500€)**, the award given to the overall best student and best MSc. Thesis in Master of Science in Physical Land Resources programme- 20/09/2012
- **Best student (CGPA: 4.65 / 5)** from BSc. Agricultural land use and management class of 2005-2008, given at the graduation ceremony, on 19/01/2009 at Makerere University

#### Publications

##### [EMMANUEL OPOLOT - Google Scholar](https://scholar.google.com/citations?user=EMMANUEL_OPOLOT)

##### **Book Chapters**

1. Olupot, G., Smucker, A. J. M., Kalyango, S., **Opolot, E.**, Orum, B., Musinguzi, P., Twaha, A. B., Singh, B.R. 2021. Novel climate smart water and nutrient conservation technologies for optimizing productivity of marginal coarse-textured soils. in: Sustainability in Natural Resources Management and Land Planning. Springer International.
2. Musinguzi, P., Ebanyat, P., Basamba, T.A., Tumuhairwe, J.B., **Opolot, E.**, Olupot, G., Tenywa, J.S., and Majaliwa, M.J.G. 2021. Sustainable Land Management Paradigm: Harnessing Technologies for Nutrient and Water Management in the Great Lakes Region of Africa. In book: Sustainability in Natural Resources Management and Land Planning. DOI: 10.1007/978-3-030-76624-5\_12; Springer International.
3. Cornelis W.M., Verbist K., Araya T., **Opolot E.**, Wildemeersch J.C.J., Al-Barri B. (2021). Fully Coupled Surface–Subsurface Hydrological Modeling to Optimize Ancient Water Harvesting Techniques. Book Chapter 4 In Handbook of Water Harvesting and Conservation: Case Studies and Application Examples, First Edition. Edited by Saeid Eslamian and Faezeh Eslamian. 16p. <https://doi.org/10.1002/9781119776017.ch4>
4. Olupot, G., Twaha A. A. B., Ebanyat, P., Musinguzi, P., **Opolot, E.**, Katusabe, A.A., Bekunda, M.A., Singh, B.R. (2019). Making Sense Out of Soil Nutrient Mining and Depletion in Sub-Saharan Africa. Book Chapter (3), in Soil Degradation and

**Journal Publications**

1. Kabasiita, J.K.; Opolot, E.; Malinga, G.M. 2022. Quality and Fertility Assessments of Municipal Solid Waste Compost Produced from Cleaner Development Mechanism Compost Projects: A Case Study from Uganda. *Agriculture* 2022, 12, 582. <https://doi.org/10.3390/agriculture12050582>
2. Kabasiita, J.K.; Malinga, G.M., Odongo, J.C. W. and **Opolot, E.** 2021. Factors influencing utilization of municipal solid waste compost among urban farmers in western Uganda. *CABI Agriculture and Bioscience*,2:47: <https://doi.org/10.1186/s43170-021-00067-2>
3. Ivanova, A.; Denisova, E.; Musinguzi, P.; **Opolot, E.**; Tumuhairwe, J.B.; Pozdnyakov, L.; Manucharova, N.; Ilichev, I.; Stepanov, A.; Krasilnikov, P. Biological Indicators of Soil Condition on the Kabanyolo Experimental Field, Uganda. *Agriculture* 2021, 11, 1228. <https://doi.org/10.3390/agriculture11121228>
4. Ruley A.J., Tumuhairwe J.B., Amoding A., Twaha B.A., **Opolot E.**, Oryem-Origa H. (2020). Enhancement effect of organic manure on phytoremediation of hydrocarbon-contaminated soils in the Sudd wetlands, South-Sudan. *Applied and Environmental Soil Science*. <https://doi.org/10.1155/2020/4614286>
5. Ruley A.J., Tumuhairwe J.B., Amoding A., **Opolot E.**, Oryem-Origa H., Twaha B.A. (2019). Assessment of plants for phytoremediation of hydrocarbon-contaminated soils in the Sudd Wetland of South Sudan. *Plant, Soil and Environment*. <https://doi.org/10.17221/322/2019-PSE>
6. Finke, P., **Opolot, E.**, Balesdent, J., Berhed, A.A., Boeckx, P., Cornu, S., Harden, J., Hatte, C., Williams, E., Doetterl, D. (2019). Can SOC modelling be improved by accounting for pedogenesis? *Geoderma*, 338: 513–524.
7. Ojok J., Omara P., **Opolot E.**, Odongo W., Olum S., Gijs D.L., Gellynck X., De Steur H., Ongeng D. (2019). Iodine Agronomic Biofortification of Cabbage (*Brassica oleracea* var. *capitata*) and Cowpea (*Vigna unguiculata* L.) Is Effective under Farmer Field Conditions. *Agronomy*, 9, 797; doi:103390/agronomy9120797
8. **Opolot, E.**, Tesfay Araya, W., Nyssen, J., Bashar, A., Verbist, K., Cornelis, W. (2016): Evaluating in situ water and soil conservation practices with a fully coupled, surface/subsurface process-based hydrological model in Tigray, Ethiopia, *Land Degradation & Development*, Volume 27, Issue 8; DOI: 10.1002/ldr.2335.
9. **Opolot, E.**, Yu, Y. Y., Finke, P. A. (2015). Modelling soil genesis at pedon and landscape scales: Achievements and problems, *Quat. Int.*,34–46, doi:10.1016/j.quaint.2014.02.017.
10. **Opolot, E.**, Finke, P. A. (2015). Evaluating sensitivity of silicate mineral dissolution rates to physical weathering using a soil evolution model (SoilGen2.25), *Biogeosciences*, 12, 6791- 6808, doi: 10.5194/bg-12-6791-2015.
11. **Opolot, E. (2013)**. Application of remote sensing and geographical information systems in flood management: A review, *Res. J. Appl. Sci. Eng. Technol.* vol.: 6 issue: 10 pag.: 1884 – 1894, 2013
12. Finke, P. A., Vanwalleghem, T., **Opolot, E.**, Poesen, J., Deckers, J. (2013). Estimating the effect of tree uprooting on variation of soil horizon depth by confronting pedogenetic simulations to measurements in a Belgian loess area, *J. Geophys. Res. Earth Surf*, 118(4), 2124–2139, doi:10.1002/jgrf.20153.