

## **Dr. Michael Owor**

Senior Lecturer / Head / Chair

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### **Professional interests**

I have over 20 years professional and research experience using tools such as site measurements, remote sensing, GIS, isotopes and geophysics to develop groundwater and to evaluate and map out environmental influences and impacts on water resources. My career goal is to contribute to the availability of safe-water and hygiene for food security, health, socio-economics, etc. under conditions of climate change/variability.

### **Educational qualifications**

- 2006 - 2010, **PhD Groundwater-surface water interactions**, University College London, UK
- 2002 - 2006, **PhD Environmental Geohydrology**, Makerere University, Kampala, Uganda
- 1998 - 2000, **MSc Water Resource Surveys (Distinction)**, ITC, Enschede, The Netherlands
- 1991 - 1994, **BSc Geology and Chemistry (Hons)**, Makerere University, Kampala, Uganda

### **Professional Trainings**

- Mar 2013, Certificate on National Training on Advanced Isotope Hydrology, Makerere University, Kampala, Uganda.
- Apr 2011, Certificate on Trainers in the Use of ICT Teaching Materials in the Water Resources Management, Nuclear Research Centre of Algiers, Algiers, Algeria.
- Safe Water Summit 2010: new solutions to real needs. 29 September - 1 October, 2010, Copenhagen. Organised by Danish Red Cross, Copenhagen, Denmark.
- Dec 2010, Certificate on National Training on Basic Isotope Hydrology, Makerere University, Kampala, Uganda.
- 6 - 10 Apr 2008, Surface-Ground Water Interaction: From Watershed Processes to Hyporheic Exchange, FIVA International PhD Course, International Research School of Water Resources, University of Copenhagen, Denmark.
- Feb - Mar 2006, Certificate on Modern Data Acquisition and Processing Tools for Integrated Water Resources Management, Addis Ababa University, Ethiopia and ITC, Netherlands.
- Feb - Mar 2005, Certificate on Statistical Methods and Computer Applications in Research, Makerere University, Kampala, Uganda.
- 25 Aug 2005, Pedagogy for higher education lecturers, School of Education, Makerere University Uganda.
- 11 - 15 Oct 2004, Pedagogical Training Workshop for Teachers of higher institutions of learning, School of Education, Makerere University, Uganda.
- May - Jun 2004, Certificate on 14th United Nations International Training Programme on Remote Sensing Education for Educators, Stockholm University, Stockholm, Sweden.
- Sep 2002, Certificate on Capacity Building and Policy Development in E-learning in Higher Education: Trainer of Trainers (TOTII) course, Makerere University, Kampala, Uganda.
- Apr - May 1997, Certificate on Nuclear Analytical Techniques in Mineral Exploration, Centre for Energy Research and Training (CERT), Ahmadu Bello University, Zaria, Nigeria.
- Apr - Nov 1995, Postgraduate Diploma on Advanced Groundwater Resources Management, Institute for Groundwater Studies (IGS) University of Orange Free State Bloemfontein, South Africa.

### **Employment**

- Since Oct 2015, **Head / Chair**, Dept. of Geology & Petroleum Studies, Makerere University, Uganda.

- Apr 2013 - Jun 2014, Appointed **Ag. Chair**, Dept. of Geology & Petroleum Studies, Makerere University, Uganda.
- Jul 2010 - Present, **Senior Lecturer**, Dept. of Geology & Petroleum Studies, Makerere University.
- Jun 2001 - Jun 2010, **Lecturer**, Dept. of Geology & Petroleum Studies, Makerere University.
- Apr 1997 - May 2001, **Assistant Lecturer**, Dept. of Geology & Petroleum Studies, Makerere University.
- Oct 1994 - Mar 1997, **Teaching Assistant**, Dept. of Geology & Petroleum Studies, Makerere University.

### Teaching Activities/Administrative Duties

- **Undergraduate:** Crystallography; Exogenic Natural Hazards (yr I); Hydrogeology (yr II); Water Quality and Instrumentation (yr III); Supervision of students Industrial Attachment (yr II) and geological fieldworks (yr I - III).
- **Graduate:** Hydrogeology; Research Methods; Supervision of students geological fieldwork (MSc I).
- **Representing** the Department in several College of Natural Sciences (CONAS) committees, Faculty of Science Examinations Committee (2000-2006), Departmental Examinations Coordinator (2000-2006), Department of Geology Computer Manager/Coordinator (2000-2006), Department of Geology Finance Committee, Department of Geology Meetings Minutes Secretary (2000-2005), Faculty of Science Library Committee (1999-2001), Faculty of Science Vehicles Committee (1999-2001).

### Graduate Student Supervision/Examination

#### *Supervision Completed:*

- Guma, B. (2009)., MSc (Mak) dissertation on *An investigation on the impact of vermiculite mining and processing operations on groundwater quality in Namekhala area, Manafwa district, Makerere University, Kampala, Uganda.*
- Draleke T.M.T.M. (2015), MSc (Mak) dissertation topic on the *Groundwater physical and chemical characteristics of the Weathered Crystalline Rock Aquifers in Kamuli District, Eastern Uganda, Makerere University, Kampala, Uganda.*
- Tusiime K. R.(2015)., MSc (Mak) student dissertation topic on the *Characterisation of heavy metals in petroleum drilling solid wastes and recommended disposal options in the Albertine Graben-Western Uganda, Makerere University, Kampala, Uganda.*

#### *Supervision Ongoing:*

- Ndikubwimana, N., MSc (Mak) student dissertation topic on the *Effect of mining on water and sediments in the Kilembe and Mwerasandu areas, Uganda and Gatumba, Rwanda.*
- Okullo, J., MSc (Mak) student dissertation topic on the *Groundwater storage estimation using MRS and aquifer tests in weathered crystalline rock aquifers of northern Uganda.*
- Aheebwa, J., MSc (Mak) student dissertation topic on the *Hydrogeological assessment of sustainable groundwater abstraction in gazetted Namanve industrial and business park, Mukono district.*
- Akatukunda, S., MSc (Mak) student dissertation topic on the *Groundwater chemistry in selected regions of the Albertine Graben.*
- Osimwe, G., MSc (Mak) student dissertation on *Assessing the impacts of land use and land cover on surface water quality in the Kiha watershed, Hoima - Masindi districts, Uganda.*
- Guma, B. PhD (Mak) student thesis topic on the *Potential Hydrogeology Contaminants Derived from Petroleum Activities in the Albertine Graben. Since Mar 2013. (Primary Supervisor)*
- Nayebare, G.J., PhD (Mak) student thesis topic on the *Transport of faecal microorganisms and nitrates in shallow groundwater systems characterized by field piezometry and surface geophysics. Since Nov 2016. (Primary Supervisor)*

#### *Internal Examination:*

- Kagwisagye, S. (2015), PhD (Centre for Freshwater and Environmental Studies, Department of Applied Science, Dundalk Institute of Technology, Dublin, Ireland) student thesis on *Sourcing of sustainable groundwater for rural water supplies: an assessment of a weathered crystalline rock aquifer system in the western part of central Uganda.*

#### **Professional roles**

- Member of International Association of Hydrogeologists (IAH) (**No: 134819**),
- Member of IAH Commission on Groundwater and Climate Change (IAH-CGCC);
- Member of the Geological Society of Uganda (GSU) and the Geological Society of Africa (GSAf);
- Member, National Committee of the International Geosciences Programme (IGCP) (from Dec 2012);
- Member, National Task team to set criteria and evaluate applications for registration of Hydrogeologists and hydrogeological companies (from Jan 2016);

#### **Research projects**

- Co-PI (2014-2019). Research Consortium Grant on Sustaining urban groundwater-fed water supply and sanitation systems in Africa, being carried out in Uganda, Kenya and Senegal, funded by the Royal Society and DFID, UK.
- Co-PI (2015-2019). Research Consortium Grant on A hidden crisis: unravelling current failures for future success in rural groundwater supply being carried out in Uganda, Malawi and Ethiopia, funded by the Unlocking the Potential for Groundwater for the Poor in Sub-Saharan Africa (UPGro), funded by Natural Environment Research Council (NERC), UK.
- Coordinator EnPe programme (2014-2015), successfully applied for the renewal of project from January 2016 - January 2020, to involve Makerere University, University of Juba, South Sudan and University of Bergen, Norway totalling NOK 8.5 million (~ US\$ 1 million).
- Jan - Dec 2014. Development of Shared Groundwater resources in the Mt. Elgon Region under conditions of Climate Variability and Change. IGAD Inland Water Resources Management Programme (IGAD-INWRMP) Research Grant Program on Integrated River Basin Management (FED/2013/316-594). PI, Makerere University and Nairobi University.
- Sep 2003 - Dec 2013: Groundwater recharge in Uganda (UGCF-2013-260). Commonwealth Research Fellow at University College London, Commonwealth Research Commission in the United Kingdom.
- Sep 2013 - Oct 2014: Sustaining urban water-fed groundwater supplies and sanitation systems in Africa (AN130031). Royal Society/DFID Africa Capacity-Building Initiative, Draft Scientific Network Award Proposal. PIs: Dr. Richard Taylor (University College London, UK), Prof. Cheikh Becaye Gaye (University Cheikh Anta Diop, Senegal), Prof. Daniel Olago (University of Nairobi, Kenya), Dr. Michael Owor (Makerere University, Uganda).
- Mar 2011 - Mar 2012: Uganda national expert on mainstreaming groundwater consideration into the integrated management of the Nile River Basin. Funded by IAEA, Vienna, Austria. (RAF/8/042).
- 2012-2014: Co-investigator, Africa Union and European Union, Groundwater Resource in Basement rocks of Africa (GRIBA) carried out in Benin, Burkina Faso and Uganda (Ref: AURG098/04.05.11/08.OO), PI: Dr. Jean-Michel Vouillamoz (IRD, France).
- 2010-2013: Co-Investigator, Volkswagen Stiftung (Germany), Sustainable Restitution/Recultivation of Artisanal Tantalum Mining Wasteland in Central Africa: Spatial mapping of degraded mining areas from toxic elements in soils, sediments and water in Central Africa. PI: Professor Bernd Lehmann (Technical University of Clausthal, Germany).
- 2010-2011: Co-Investigator, Natural Environment Research Council (UK), Enhancing Water for Food: poverty reduction through improved management of ecosystem services for sustainable food production in sub-Saharan Africa (ESPA PPD, No. NE/I00386X/1), PIs: Professor Nuwagaba (Makerere University) & Dr. R.G. Taylor (UCL).
- 2010-2011: Co-Investigator, DFID (UK), Climate change and groundwater project: Resilience of intensive groundwater abstraction from weathered crystalline rock aquifer systems to climate

change in Africa (Ref. GA/09F/094), Pls: Dr. Alan MacDonald (BGS), Dr. Richard Taylor (UCL) and Roger Calow (ODI).

- 2006-2010: Principal Investigator, Commonwealth Staff Scholarship, Groundwater - surface water interactions on deeply weathered surfaces of low relief: evidence from Lakes Victoria and Kyoga (Ref. UGCA-2006-141); University of London Central Research Fund; University College London Graduate School Research Projects Fund; Dudley Stamp Memorial Fund.
- 2007 - 2009: Principal Investigator, International Foundation for Science (IFS), Sweden. Research support for Monitoring and modelling of the interactions between groundwater and surface water in the Victoria Nile Basin of Uganda (W/3428-1).
- 2003-2004: Principal Investigator, International Foundation for Science (IFS), Sweden. An Environmental Geohydrologic Evaluation of the Lake George Wetlands as a Natural Barrier Against the Migration of Heavy Metals Derived from the Kilembe Mines (W/3428-2).

### Organisation of Conferences/Community Outreach

- Jun 2008: Editorial Committee of the Proceedings of the International conference on Groundwater and Climate in Africa, 24-28 June 2008, Kampala, Uganda.
- 23 – 25, Jul 2007: Editorial and Secretariat Committees, International conference on the East African Rift System (EARS), Kampala, Uganda.
- 10 - 12, Sep 2001: Secretariat Committee, Regional conference of the Geological Society of Uganda/Geological Society of Africa in Kampala, Uganda.
- 1999 - 2001: Co-Editor, The Geological Society of Uganda (GSU) Newsletter.
- Since 2002: Community outreach involving the development of groundwater resources and evaluation of the environmental impact by various anthropogenic activities on water, soils and geology in several districts of Uganda.

### Refereed International Journal articles

- Nieder, R., Weber, T.K.D., Paulmann, I., Muwanga, A., **Owor, M.**, Naramabuye, F., Gakwerere, F., Biryabarema, M., Biester, H. and Pohl, W. (2014). The geochemical signature of rare-metal pegmatites in the Central Africa Region: Soils, plants, water and stream sediments in the Gatumba tin-tantalum mining district, Rwanda. *Journal of Geochemical Exploration*, doi: 10.1016/j.gexplo.2014.01.025.
- **Owor, M.**, Taylor, R.G., Mukwaya, C. and Tindimugaya, C. (2011). Groundwater - surface water interactions on deeply weathered surfaces of low relief: evidence from Lakes Victoria and Kyoga. *Hydrogeology Journal*, 19, 1403-1420.
- Batte, A.G., Barifaijo, E., Kiberu, J.M., Kawule, W. Muwanga, A. **Owor, M.** and Kisekulo, J. (2010). Correlation of Geoelectric Data with Aquifer Parameters to Delineate the Groundwater Potential of Hard rock Terrain in Central Uganda. *Pure and Applied Geophysics*, 167(12), 1549-1559.
- **Owor, M.**, Taylor, R.G., Tindimugaya, C. and Mwesigwa, D. (2009). Rainfall intensity and groundwater recharge: empirical evidence from the Upper Nile Basin. *Environmental Research Letters*, 4 (2009) 035009 (6pp). doi:10.1088/1748-9326/4/3/035009.
- **Owor, M.**, Taylor, R.G., Thompson, J., Mukwaya, C. and Tindimugaya, C. (2009). Monitoring groundwater - surface water interactions in the Upper Nile basin of Uganda. Groundwater and Climate in Africa (Proceedings of the Kampala Conference, June 2008), *International Association of Hydrological Sciences (IAHS) Publication*, 334, 68-75.
- Batte, A.G., Muwanga, A. and Sigrist, P.W. and **Owor, M.** (2008). Vertical electrical sounding as an exploration technique to improve on the certainty of groundwater yield in the fractured crystalline basement aquifers of eastern Uganda. *Hydrogeology Journal*, 16, 1683 – 1693.
- Barifaijo, E., **Owor, M.** and Erima, G. (2008). Enrichment characteristics in the upper mantle xenoliths from the Bufumbira basaltic rocks, southwestern Uganda. *African Journal of Science and Technology, Science and Engineering Series*, 9(1), 85-101.
- **Owor, M.**, Muwanga, A. and Pohl, W. (2007). Wetland Change Detection and Inundation north of Lake George, western Uganda using Landsat Data. *African Journal of Science and Technology: Science and Engineering Series*, 8(1), 94-106.

- **Owor, M.**, Hartwig, T, Muwanga, A., Zachmann, D. and Pohl, W. (2007). Impact of tailings from the Kilembe copper mining district on Lake George, Uganda. *Environmental Geology*, 51(6), 1065-1075.
- Hartwig, T, **Owor, M.**, Muwanga, A., Zachmann, D. and Pohl, W. (2005). Lake George as a sink for contaminants derived from Kilembe copper mining area, western Uganda. *Mine Water and the Environment*, 3(24), 114-123.

### Manuscripts

- Schagerl, M. (Ed.) (2016). Soda Lakes of East Africa. Woldegabriel, G., Olago, D., Dindi, E. and **Owor, M.**, Chapter 2, Genesis of the East African Rift Valley. Springer International Publishing, DOI: 10.1007/978-3-319-28622-8, 290p.
- Taylor, R., Tindimugaya, C., **Owor, M.** and Shamsudduha, M. (**Eds.**) (2009). Groundwater and Climate in Africa. International Association of Hydrological Sciences (IAHS) Publication 334, 260p.
- Barifajjo, E. (Ed.) (2002). The Geology of Uganda. Manuscript compiling the Geology of Uganda and its contribution to socio-economic development. **Owor, M.**, Ugandan Fossils chapter (p.140-149) and Groundwater Development in Uganda chapter (p.150-154).
- Tindimugaya, C. and Owor, M. (*in prep*). Africa Groundwater Atlas - Uganda; [http://earthwise.bgs.ac.uk/index.php/Main\\_Page](http://earthwise.bgs.ac.uk/index.php/Main_Page).

### Theses/Dissertations

- **Owor, M.** (2009). Groundwater - surface water interactions on deeply weathered surfaces of low relief in the Upper Nile Basin of Uganda. **PhD thesis**, University College London, U.K.
- **Owor, M.** (2006). An environmental geohydrologic evaluation of the Lake George wetlands as a natural barrier against the migration of heavy metals derived from the Kilembe Copper Mine. **PhD thesis**, Makerere University, Kampala, Uganda.
- **Owor, M.** (2000). The long-term interaction of Groundwater with Lake Naivasha, Kenya: A numerical simulation of the relationship between groundwater and lake allowing for fluctuating lake levels. **MSc dissertation**, ITC, The Netherlands.
- Mai, V.T., Mogesie, A.W. and **Owor, M.** (1999). Terrain mapping and water resource surveys in Teba catchment, Malaga, Spain. **Field project dissertation**, ITC, The Netherlands.
- **Owor, M.** (1994). Geological mapping project of Area H, Gayaza, Mbarara District, western Uganda. **BSc dissertation**, Department of Geology, Makerere University, Kampala, Uganda.

### Conferences

- **Owor, M.**, Taylor, R.G., Tindimugaya, C. and Pule J. (2015). Quantifying groundwater recharge in deeply weathered crystalline rocks in the Upper Nile Basin: evidence from observations and modelling, 42<sup>nd</sup> International Association of Hydrogeologists (IAH) Congress, 13-18 September 2015, Rome, Italy. Oral Presentation.
- Observed changes in groundwater storage across Africa (2015). The Chronicles Consortium (in alphabetical order): Abiye, T., Ammar, S.B., Bouchaou, L., Boukari, M., Favreau, G., Kashaigili, J., Koussoubé, Y., MacDonald, A., Nazoumou, Y., Ngatcha B.N., **Owor, M.**, Scanlon, B., Taylor, R., Totin, H., Villholth, K., 42<sup>nd</sup> International Association of Hydrogeologists (IAH) Congress, 13-18 September 2015, Rome, Italy. Oral Presentation.
- Vouillamoz, J.M., Lawson, F.M.A., Yalo, N. Koita, M., **Owor, M.**, Okullo, J. and Tindimugaya, C. (2015). Quantification of groundwater reserves in Aquifers of African basement: comparison of first results obtained in Benin, Burkina Faso and Uganda. 20<sup>th</sup> International Conference of the International Association of Hydrogeologists, French Chapter, La Roche-sur-Yon, France, 11-13 June, 2015.
- Taylor, R.G., **Owor, M.** and Kaponda, A. (2014). Rainfall intensity and groundwater recharge: evidence from ground-based observations in East Africa. IAH 41<sup>st</sup> Congress in Marrakesh (Morocco), Abstract T2140, Oral presentation.
- Taylor, R., **Owor, M.** and Kaponda, A. (2013). Rainfall intensity and groundwater recharge: evidence from ground-based observations in East Africa. Fall Meeting of the American Geophysical Union (AGU) in San Francisco, USA, 9-12, December, 2013.

- Taylor, R., Gaye, C.B., Olago, D. and **Owor, M.** (2013). Sustaining urban water-fed groundwater supplies and sanitation systems in Africa. The Royal Society-DFID Network Grants Workshop, Dakar, Senegal, 27 - 28, October, 2013.
- Weber, T., Paulmann, I., Muwanga, A., **Owor, M.**, Nayebare, Y., Naramabuye, F., Ndoli, A., Nkurunziza, C., Ndabaneze, P., Gakwerere, F., Karasira, G., Dauck, H.P. and Nieder, R. (2010). Toxic elements in soils, sediments and water, Grantees Meeting of the Volkswagen Foundation's Sub-Saharan Africa Initiative, Kassel-Witzenhausen, 20-24, September, 2010.
- **Owor, M.**, Taylor, R.G. and Thompson, J. (2009). Monitoring of the groundwater - surface water interactions in the Upper Nile basin of Uganda - Recent findings. Joint International Convention of the 8th IAHS Scientific Assembly and 37th IAH Congress: Water: A vital resource under stress - How science can help, 6-12, September, 2009, Hyderabad, India.
- **Owor, M.**, Taylor, R.G., Tindimugaya, C., Mwesigwa, D. and Bradley, G. (2009). Rainfall intensity and groundwater recharge: empirical evidence from the Upper Nile Basin. Groundwater recharge Assessment Meeting – Are we any closer to an answer? 20-21, May, 2009, University of East Anglia, Norwich, U.K.
- **Owor, M.**, Taylor, R.G., Tindimugaya, C. and Mukwaya, C. (2009). Monitoring groundwater - surface water interactions in the Upper Nile basin of Uganda - Preliminary results. International conference on Groundwater and Climate in Africa, 24-28, June, 2008, Kampala, Uganda.
- **Owor, M.**, Hartwig, T., Muwanga, A., Zachmann, D. and Pohl, W. (2007). Heavy metal speciation and loading of Lake George since the pre-mining period of the old Kilembe copper mine, western Uganda. Abstract volume of the International conference on the East African Rift System (EARS), 23-25, July, 2007, Kampala, Uganda.
- **Owor, M.**, Hartwig, T., Muwanga, A., Zachmann, D. and Pohl, W. (2005). Findings of the environmental geohydrologic evaluation of the Lake George wetlands as a natural barrier against the migration of heavy metals derived from the Kilembe copper mine. Proceedings of the Science for Humanity Conference of the International Science Congress (ISC) 2005, 3-6, August, 2005, Putra World Trade Centre, Kuala Lumpur, Malaysia.
- **Owor, M.**, Hartwig, T., Muwanga, A., Zachmann, D. and Pohl, W. (2004). Preliminary Findings of the Lake George Wetlands as a Natural Barrier against the migration of Heavy Metals derived from the Kilembe Copper mine. Proceedings of the international conference on The East African Rift System: Geodynamics, Resources, and Environment, 20-24, June, 2004, United Nations Conference Centre, Addis Ababa, Ethiopia.
- Biryabarema, M. and Muwanga, A. and **Owor, M.** (2001). Groundwater protection and sanitation in selected decentralised districts of Uganda. Proceedings of the regional conference of the Geological Society of Uganda/Geological Society of Africa, 10-12, September, 2001, Kampala, Uganda.
- Biryabarema, M. and **Owor, M.** (2001). Water catchment monitoring in the Rwenzori Mountains National Park, Western Uganda. Proceedings of the regional conference of the Geological Society of Uganda/Geological Society of Africa, 10-12, September, 2001, Kampala, Uganda.
- **Owor, M.** (2000). The long-term interaction of groundwater with Lake Naivasha, Kenya - A numerical simulation. Proceedings of the Geological Society of Kenya (GSK) conference, 16-19, November, 2000, Nairobi, Kenya.

## References

- 1) **Prof. Richard Taylor**, Department of Geography, University College London, Gower Street, WC1E 6BT London, United Kingdom. E-mail: richard.taylor@ucl.ac.uk, r.taylor@geog.ucl.ac.uk. Tel: +44 207 679 0591.
- 2) **Prof. Robert Becht**, ITC, University of Twente, P.O. Box 6, 7500 AA Enchede, The Netherlands. Tel: +31 53 4874297, Email: becht@itc.nl.
- 3) **Prof. Andrew Muwanga**, Department of Geology & Petroleum Studies, Makerere University. PO Box 7062, Kampala, Uganda. Tel: +256 778 976 417, E-mail: amuwanga@sci.mak.ac.ug.
- 4) **Prof. Walter Pohl**, 3500 Krems an der Donau, Austria. Tel: +43 2732 70 505, Email: walter@walter-pohl.com.

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