

NAFYAD KAWO, Ph.D, MSc.

Contact Information

2311 W Street, Apt 11, Lincoln, NE, USA

Email: nkawo@aquageoframeworks.com

EDUCATION

Ph.D. in Natural Resource Sciences (Hydrological Sciences)

University of Nebraska-Lincoln, Nebraska, USA – 2024

M.Sc. in Water Science and Engineering (Hydrology and Water Resources)

UNESCO-IHE, Institute for Water Education, Delft, Netherlands – 2015

M.Sc. in Physical Land Resources (Land Resources Engineering)

Vrije Universiteit Brussels (VUB), Brussels, Belgium – 2013

B.Sc. in Applied Geology

Mekelle University, Mekelle, Ethiopia – 2007

PROFESSIONAL TRAINING & CERTIFICATIONS

- **Machine Learning & Data Science:**

- *Deep Learning A-Z: Hands-On Artificial Neural Networks* (2023, Udemy, 22.5 hrs)
- *Machine Learning A-Z: Python and R in Data Science* (2022, Udemy, 42.5 hrs)
- *Complete Machine Learning & Data Science Bootcamp* (2022, Udemy, 44 hrs)
- *Introduction to Python & AI* (*Global AI Hub*, 2021-2022)
- *Introduction to AI, Robotics, and Data* (*Global AI Hub*, 2022)

- **Hydrological Tools & Models:**

- *Integrated Drought Management: Monitoring and Early Warning* (*Cap-Net Virtual Campus*, 2024)
 - *Groundwater Resources Management* (*Cap-Net Virtual Campus*, 2022)
 - *Soil and Water Assessment Tool (SWAT+)* (*eMWRE*, 2021)
 - *Hydrogeological Modeling and Strategies* (2021–2023, Online Training)
 - *Digital Water Management & Numerical Modeling* (*Life REWAT Summer School*, Pisa, Italy, 2018)
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Technical Skills

Groundwater Modeling & Hydrogeological Analysis

- Groundwater Modelling: MODFLOW, Flopy, Groundwater Vistas
- Geostatistics: Multiple-point statistics (MPS), Kriging, Variogram Analysis, stochastic hydroframe work, and Hydraulic conductivity modeling
- Tools: Geoscene3D, Leapfrog Works for geological and hydrogeological modeling
- Aarhus Workbench airborne electromagnetic data analysis and inversions
- Groundwater recharge estimation using machine learning, SWAT model,

Machine Learning & Deep learning

- Algorithms: Logistic Regression, Random Forest, SVM, MLP, XGBoost, KNN.. etc
- Deep Learning: CNN, RNN, LSTM

Data Analysis & Visualization

- Tools: Python (Pandas, NumPy, Matplotlib, Seaborn, Plotly), R, Excel
- Visualization: Interactive charts and data insights

Statistical Analysis

- Techniques: Hypothesis Testing, Regression Analysis, Time Series, PCA, Cluster Analysis

Geospatial Analysis

- Software: ArcMap, ArcGIS Pro, QGIS, GeoPandas
- Applications: Spatial data analysis, DEM analysis, map preparation

Statistical Software

- R, SPSS, Minitab, MATLAB

Water Quality Analysis and Visualization

- hydrochemical analysis and visualizing water quality data using techniques such as Piper, Stiff, Schoeller, Gibbs, and Durov diagrams.
- irrigation and agricultural water suitability through Wilcox and USSL diagrams.
- overall water quality using Water Quality Index (WQI) methodologies.

Drought Analysis

- drought conditions using indices such as the Standardized Precipitation Index (SPI), Palmer Drought Severity Index (PDSI), and Reconnaissance Drought Index (RDI)
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PROFESSIONAL EXPERIENCE

Hydrogeologist / Hydrogeophysicist

Aqua Geo Frameworks LLC, Wyoming, USA– June 2024 – Present

- Developing advanced 3D aquifer framework models by integrating borehole and geophysical data using machine learning techniques, Geoscene 3D and leapfrog
- Estimating 3D aquifer hydraulic conductivity using machine learning algorithms
- Performing Airborne Electromagnetic (AEM) data interpolation, descriptive statistics, evaluating using geophysical and borehole lithological logging, and improving the spatial resolution of aquifer models for more precise assessments.
- Conducting comprehensive borehole data analysis, compiling data from multiple databases to ensure consistency and refining the accuracy of the 3D hydro-framework model.
- Incorporating geophysical data into Geoscene 3D, visualizing results using LAS (Log ASCII Standard) files with lasio and Python plotting tools
- Applying advanced GIS data analysis, water table map, and DEM data analysis to enhance spatial data visualization
- Prepare data and build geological models using Leapfrog Works, integrating geophysical and geological data to develop accurate subsurface models.
- write proposals for groundwater modeling projects grant
- Producing maps, profiles, and detailed reports for hydro-framework model development, water table, hydraulic conductivity, borehole data, and others, documenting methodologies, assumptions, and results.

Graduate Research Assistant

University of Nebraska-Lincoln – 2020–2024

- Developed hydrostratigraphic models using Airborne Electromagnetic (AEM) data for enhanced subsurface characterization.
- Modeled 3D glacial aquifer heterogeneity utilizing multiple-point statistics and machine learning to improve groundwater management strategies.
- Created **MODFLOW 6** input data packages, including pumping rates, recharge, evapotranspiration (ET), streamflow, and hydraulic conductivity parameters.
- Incorporated aquifer heterogeneity into groundwater models, improving flow and transport parameterizations.
- Conducted groundwater flow modeling, calibration, and stream-groundwater interaction analyses under varying parameterization approaches, including pumping tests, geostatistical techniques, and machine learning-based methods.

Lecturer

Adama Science and Technology University, Ethiopia – 2015–2020

- Delivered undergraduate and postgraduate lectures in hydrogeology and geology.
- Conducted research on sustainable water management and supervised academic projects.
- Played a key role in developing an MSc degree curriculum.

Lecturer

Institute of Technology, Haramaya University, Haramaya, Ethiopia – May 2015–September 2015

- Delivered lectures to undergraduate and postgraduate students.
- Conducted demand-driven and problem-solving research.
- Advised students on academic and research matters.

Assistant Lecturer and Program Coordinator

Department of Water Resources and Environmental Engineering (WREE), Haramaya University, Haramaya, Ethiopia – 2008–2010

- Assisted undergraduate students in coursework and research activities.
- Supported faculty in conducting research initiatives and lead program
- Advised students on academic and program-related matters.

Geologist

West Arsi Zone Water Resources Office, Ethiopia – 2007–2008

- Conducted geological mapping and mineral resource evaluations.
- Coordinated artisanal and small-scale mining operations and licensing.

RESEARCH & PUBLICATIONS

Peer-Reviewed Journal Articles

Kawo, N.S., Jesse Korus, Yaser Kishawi, Erin Haacker, and Aron Mittelstet (2024), *Machine Learning-based 3D Probabilistic Hydrofacies Models*, AGU Water Resources Research Journal. [Link](#)

Kawo, N.S., Korus, J., & Lundh Gulbrandsen, M. (2023). *Multiple-Point Statistical Modeling of 3D Glacial Aquifer Heterogeneity for Improved Groundwater Management*. Hydrogeology Journal. [Link](#)

Mubialiwo, A., Abebe, A., **Kawo, N.S.**, et al. (2022). *Hydrodynamic Modelling of Floods and Estimating Socio-Economic Impacts of Floods in Ugandan River Malaba Sub-Catchment*. Earth Systems and Environment, 1-23. [Link](#)

Hordofa, A.T., Leta, O.T., Alamirew, T., **Kawo, N.S.**, et al. (2021). *Performance Evaluation and Comparison of Satellite-Derived Rainfall Datasets over the Ziway Lake Basin, Ethiopia*. Climate, 9(7), 113. [Link](#)

Kawo, N.S., Hordofa, A.T., & Karuppannan, S. (2021). *Performance Evaluation of GPM-IMERG Early and Late Rainfall Estimates over Lake Hawassa Catchment, Rift Valley Basin, Ethiopia*. Arabian Journal of Geosciences, 14(4), 1-14. [Link](#)

Haji, M., Karuppannan, S., Qin, D., Shube, H., & **Kawo, N.S.** (2021). *Potential Human Health Risks Due to Groundwater Fluoride Contamination: A Case Study Using Multi-Techniques Approaches (GWQI, F.P.I., G.I.S., HHRA) in Bilate River Basin of Southern Main Ethiopian Rift, Ethiopia*. Archives of Environmental Contamination and Toxicology, 80, 277–293. [Link](#)

Gebere, A., **Kawo, N.S.**, Karuppannan, S., Hordofa, A.T., & Paron, P. (2021). Numerical Modeling of Groundwater Flow System in the Modjo River Catchment, Central Ethiopia. *Modeling Earth Systems and Environment*, 7, 2501–2515. [Link](#)

Karuppannan, S., & **Kawo, N.S.** (2019). Groundwater Quality Assessment Using Geospatial Techniques and WQI, Northeast of Adama Town, Oromia Region, Ethiopia. *Hydrospatial Analysis*, 3(1), 22-36. [Link](#)

Kawo, N.S., & Karuppannan, S. (2018). Groundwater Quality Assessment Using Water Quality Index and GIS Technique in Modjo River Basin, Central Ethiopia. *Journal of African Earth Sciences*, 147, 300-311. [Link](#)

Kawo, N.S., Zhou, Y., Magalso, R., & Salvacion, L. (2018). Optimization of an Artificial-Recharge–Pumping System for Water Supply in the Maghaway Valley, Cebu, Philippines. *Hydrogeology Journal*, 26(3), 963-977. [Link](#)

Conference Presentations

Kawo N.S, Korus (2023) Comparisons of Machine Learning-based 3D Probabilistic Hydrofacies Models and Estimation of Quaternary Glacial Aquifer Properties for Improved Groundwater Flow Model Parameterizations, Daugherty Water for Food Global Conference

Kawo N.S, Korus J., Haacker E (2022), 3D Probabilistic Modeling of Glacial Aquifer Framework using Multiple-point Statistics and Deep Neural Network, **2022** Daugherty Water for Food Global Institute (DWFI) Research Forum and UNL students research days

Mats Lundh Gulbrandsen, Tom Martlev Pallesen, Thomas Bager Rasmussen, Thomas Mejer Hansen, Ulrika Sabel, **Kawo N S**, (2022) Multiple Point Statistics – 3 Hydrogeological Case Studies, SAGEEP '22 ABSTRACTS, <https://fasttimesonline.co/sageep-22-abstracts/>

Kawo N.S, Korus J (2021) Hydrostratigraphic Modeling using Airborne Electromagnetic (AEM) data: Comparisons of Different Inversion Models – American Society of Agricultural and Biological Engineers (ASABE)- 2021 Annual International Meeting

Kawo N.S, Korus J. (2021) Modeling Glacial-Aquifer Heterogeneity using Multiple-Point Statistics (MPS)- 47th IAH Congress – IAH 2021 Brazil

Kawo N.S, Korus J. (2021) Multiple-point statistical simulation of glacial aquifer heterogeneity for improved groundwater management- [2021 Nebraska Water Center Conference: The Shape of Water in Western Nebraska](https://watercenter.unl.edu/resources/waterSymposium/2021/Posters.pdf) <https://watercenter.unl.edu/resources/waterSymposium/2021/Posters.pdf>

Kawo N.S, Korus J., Haacker E (2021) Streambed and aquifer connectivity revealed by 3D MPS modeling of AEM resistivity data: A glacial aquifer case study, AGU 2021 Fall Meeting, New Orleans, LA, <https://agu.confex.com/agu/fm21/meetingapp.cgi/Paper/815761>

Boreshu, A.G, **Kawo, N.S**, Hordofa A.T, Shankar K (2019), Numerical Simulation of Aquifer Responses to the Recharge Changes and Pumping Stress: The case of Modjo River Catchment, Central Ethiopia, page 381, Proceedings of IAH2019, the 46th Annual Congress of the International Association of Hydrogeologists, <https://www.scribd.com/document/436140921/iah-2019-Proceedings>

Kawo, N.S., Boreshu, A.G., Shankar K., (2017), Groundwater Flow Modeling in Modjo River Catchment, Central Ethiopian, Abstract of International Groundwater Conference (IGWC-2017), New Delhi, India

Kawo, N. S., Zhou Y., Magalso R. (2016) Optimization of an Artificial Recharge-Pumping System for Water Supply in the Maghaway Valley, Cebu, Philippines, Abstract of 35th International Geological Congress, Cape Town, South Africa. paper no 1825,
<http://www.americangeosciences.org/information/igc>: Abstract page:
<http://www.americangeosciences.org/sites/default/files/igc/1825.pdf>

Unpublished reports

- Groundwater Recharge Estimation Using Machine Learning in Nebraska Sand Dune, USA
 - Gila Bend, Arizona, Hydro-framework Modeling Using Machine Learning and 3D Hydraulic Conductivity Estimation, with AGF, LLC
 - Examining the Relationship Between Drought Indices and Groundwater Levels in Shell Creek Watershed, Nebraska
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GRANTS & FUNDING

- **USGS 104b Grant (USA)**: Advancing Groundwater/Surface Water Models Using Geophysics-Derived Hydrostratigraphy (Co-Investigator, \$20,000, 2020–2023)
 - **Adama Science and Technology University Grant (Ethiopia)**: Simulation-Optimization Modeling for Groundwater Resources Management in Modjo River Catchment, Ethiopia (Principal Investigator, \$10,000, 2016–2018)
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AWARDS & HONORS

- Editor's Choice Paper (*Hydrogeology Journal*, 2023) <https://iah.org/wp-content/uploads/2024/01/Hydrogeology-Journal-Editors-Choice-articles-Summary-list.pdf>, <https://link.springer.com/article/10.1007/s10040-024-02768-0?fbclid=IwY2xjawGsFv1leHRuA2FlbQlXMAABHctLeugldmC2INAFjoig2P8zLHGonhAfMkmz8SAjC GOQXI8O rZM4wN wA aem qvwRsV3V2LQkZ8AX0 F8uw>
- Skala Fellowship Award (*University of Nebraska-Lincoln*, 2022)
- Widaman Distinguished Graduate Assistant Award (*University of Nebraska-Lincoln*, 2021)
- Milton E. Mohr Award (*University of Nebraska-Lincoln*, 2021)
- SYMPLE, School of Hydrogeological Modelling and Project-Related Strategies (Online Training), 2021
- Research Outstanding Performance Award (2nd place) as Principal Investigator, School of Applied Natural Sciences, Adama Science and Technology University, 2018

- 1st International LIFE REWAT Summer School Scholarship on Digital Water Management and Agroecosystem Services, Pisa, Italy, 2018
- Netherlands Fellowship Programme (NFP), Refreshment Course on Sustainable Intensification of Agriculture for Food Security, Jomo Kenyatta University, Kenya, 2017
- Netherlands Fellowship Programme (NFP), MSc. Scholarship in Water Science and Engineering (Specialization in Hydrology and Water Resources), 2013-2015
- VLIR-UOS MSc. Scholarship in Physical Land Resources (Specialization in Land Resources Engineering), 2011-2013

JOURNAL REVIEWER ACTIVITIES

- *Hydrogeology Journal, Springer*
- *Journal of Geophysical Research: Machine Learning and Computation*
- *Environmental Monitoring and Assessment, Springer*
- *Urban Climate, Elsevier*
- *Applied Water Science, Springer*
- *Arabian Journal of Geosciences, Springer*
- *Journal of African Earth Sciences, Elsevier*
- *Groundwater for Sustainable Development, Elsevier*
- *Physics and Chemistry of the Earth, Elsevier*
- *Discover Sustainability, Springer*
- *Discover Geoscience, Springer*
- *Geochemical Transactions*
- *Discover Water, Springer*
- *Discover civil engineering, springer*
- *Quaternary Science Advances*

* Certificates of reviews and records of completed review activities will be available upon request.

PROFESSIONAL MEMBERSHIPS

- International Association of Hydrological Sciences (IAHS)
- International Association of Hydrogeologists (IAH)
- Africa Groundwater Network
- National Groundwater Association (ngwa.org)

Academic/ research profiles link

ORCID: [ORCID](#)

Google Scholar [Google Scholar](#)

ResearchGate: [ResearchGate](#)

GitHub [GitHub](#)

References

- **Jared D. Abraham, MS, PG, PGP**
Aqua Geo Frameworks, LLC
10848 Ridge Rd., Fort Laramie, WY 82212
Email: jabraham@aquageoframeworks.com
Phone: (303)-905-6240
Website: www.aquageoframeworks.com
- **Ted Asch, Ph.D., P.Gp.**
Aqua Geo Frameworks, LLC
P.O. Box 791, Georgetown, CO 80444
Mobile: (720) 415-7312
Email: tasch@aquageoframeworks.com
Website: www.aquageoframeworks.com
- **Dr. Jesse Korus**
Conservation and Survey Division, School of Natural Resources
University of Nebraska-Lincoln, Lincoln, NE, USA
Email: jkorus3@unl.edu
- **Dr. Erin Haacker**
U.N.L. Earth and Atmospheric Sciences
University of Nebraska-Lincoln, Lincoln, NE, USA
Email: ehaacker2@unl.edu
- **Prof. dr. Ir. Kristine Walraevens**
Ghent University, Department of Geology, Gent, Belgium
Email: kristine.walraevens@ugent.be
- **Dr. Yangxiao Zhou, Ph.D., Associate Professor in Hydrogeology**
Water Engineering Department UNESCO-IHE Institute for Water Education
Delft, The Netherlands
Email: y.zhou@un-ihe.org