Endalkachew Abebe Kebede
endiabe@udel.edu |
University of Delaware
211 Pearson Hall | Newark, DE 19716

EDUCATION

Expected May 2026 — **PhD in Geography**
University of Delaware, Newark, Delaware
Dissertation: Global Irrigation, Water Scarcity, and Food Sustainability in the 21st century

July 2022 — **Erasmus Mundus Joint Master's Degree in Soil Science**
The University of Agriculture in Krakow, Poland, the Agricultural University of Plovdiv, Bulgaria, and Ondokuz Mayis University, Samsun, Turkey
Thesis: Soil Fertility Assessment Using Remote Sensing and In-Situ Physiological Analyses of Wheat

April 2021 — **Master of Science in Water Science and Engineering, specializing in Hydraulic Engineering and River Basin Development**
IHE Delft Institute of Water Education, Delft, The Netherlands
Thesis: 1D morphological adaptation of the Lower Zambezi River to dam construction

July 2015 — **Master of Science in Irrigation Engineering**
Haramaya University, Haramaya, Ethiopia
Thesis: A Comparison of Hydrological Models Under Climate Change on the Water Resources of Megech River Catchment, Abbay Basin, Ethiopia

July 2009 — **Bachelor of Science in Soil and Water Engineering and Management**
Haramaya University, Haramaya, Ethiopia

RESEARCH AND TEACHING EXPERIENCE

Winter 2025- — **Instructor of Record (Winter 2025),** Department of Geography and Spatial Science, University of Delaware, USA

- Teach Introduction to Geographic Data Analysis during the upcoming Winter semester
- Introduce students to the fundamentals of GIS programming, spatial statistics, and computational approaches for spatial analysis
- Guide students in applying these analytical tools to address real-world environmental challenges
- Design, grade, and assess coursework, assignments, and examinations to evaluate student performance and learning outcomes

2022-Present — **Research Assistant,** Department of Geography and Spatial Science, University of Delaware, USA

- Lead the development of MIRCA-OS, a global open-source dataset of monthly irrigated and rainfed cropped areas for the 21st century
- Develop a high-resolution (30m) global irrigated area dataset using integrated remote sensing and machine learning approaches
- Conduct global and local risk assessments of rising water scarcity on food production and supply, and analyze socio-economic and environmental drivers of persistent economic water scarcity in developing regions

- Evaluate and optimize rental payment structures in Conservation Reserve Programs (CRP) to maximize environmental benefits
- Co-authored several projects on agricultural and water sustainability, including the development of the HarvestSat dataset

2017-2019 **Researcher and Lecturer**, Guna Tana Integrated Field Research and Development Center, Debre Tabor University, Ethiopia. (75% research, 25% teaching)

- Designed and led problem-driven research projects in agricultural water management and water resources modeling
- Served as Principal Investigator for two funded projects, and worked as co-PI for the participatory eco-hydrology project
- Led large-scale community service initiatives addressing critical, prioritized local development needs
- Taught undergraduate courses, including Soil and Water Conservation and Introduction to Natural Resource Management

2012-2017 **Lecturer**, Department of Soil and Water Resource Management, Woldia University, Ethiopia. (75% teaching, 25% research)

- Served as Interim Department Head for one year, overseeing all academic and administrative operations, and as a member of the Academic Council
- Taught undergraduate courses including Surface and Ground Water Hydrology, Soil Physics, Irrigation Engineering, GIS, and Remote Sensing
- Supervised undergraduate research projects, coordinated seminars, and advised students on senior theses
- Contributed to departmental curriculum planning

OTHER APPOINTMENT

2010-2012 **Instructor,** Bahir Dar Polytechnic College, Department of Water Technology, Ethiopia.

2010 - 2010 **Irrigation Infrastructure Engineer**, Amhara State Bureau of Agriculture Irrigation Directorate, Ethiopia.

PUBLICATIONS

Published Manuscripts

2025 **Kebede, E.A.,** Oluoch, K.O., Siebert, S., Mehta, P., Hartman, S., Jägermeyr, J., Ray, D., Ali, T., Brauman, K.A., Deng, Q., Xie, W., Davis, K.F. (2025). A global open-source dataset of monthly irrigated and rainfed cropped areas (MIRCA-OS) for the 21st century. *Sci Data* 12, 208. https://doi.org/10.1038/s41597-024-04313-w

Lee, D., Anderson, W., Chen, X., **Kebede, E.A**., Flach, R., Meyer, C., Proctor, J., Ray, D., You, L., Foley, M., Kerdiles, H., Hultgren, A., Huybers. (2025). HarvestStat Africa – Harmonized Subnational Crop Statistics for Sub-Saharan Africa. *Sci Data* 12, 690. https://doi.org/10.1038/s41597-025-05001-z

Davis K.F., Anderson, W., Ehrmann, S., Flach, R., Meyer, C., Proctor, J., Ray, D., You L., Foley, M., Kerdiles, H., Hultgren, A., Huybers, **Kebede, E.A.**, Meroni M., Park, C., Lee, D. (2025). HarvestStat: A global effort towards open and standardized sub-national agricultural data. *Environmental Research Letters*. http://iopscience.iop.org/article/10.1088/1748-9326/adcb54

Wang, L., Garland, G.M., Ge, T., Guo, S., **Kebede, E.A.,** He, C., Hijri, M., Plaza-Bonilla, D., Stringer, L.C., Davis, K.F., Lee, S.-J., Feng, S., Wang, L., Wei, Z., Cao, H., Wang, Z., Xu, J., Siddique, K.H., Gan, G.Y., Zhao, M. (2025).Integrated strategies for enhancing agrifood productivity, lowering greenhouse gas emissions, and improving soil health. *The Innovation*. https://doi.org/10.1016/j.xinn.2025.101006 .

2024 **Kebede, E.A.,** Abou Ali, H., Clavelle, T., Clavelle, T., Froehlich, H.E., Gephart, J.A., Hartman, S., Herrero, M., Kerner, H., Mehta, P., Nakalembe, C., Ray, D.K., Sibert, S., Thornton, P., Davis, K.F. (2024). Assessing and addressing the global state of food production data scarcity. *Nat Rev Earth Environ* 5, 295–311. https://doi.org/10.1038/s43017-024-00516-2

Davis, K.F., Abou Ali, H., **Kebede, E.A.**, Khan, B., Sarwar, A. (2024). Where global crop yields may falter next. *Nat Food* 5, 98–99. https://doi.org/10.1038/s43016-023-00911-w

Kebede, E. A., Vasileva, S., Ivanov, B., Dengiz, O., Bojinov, B. (2024). Optimizing data collection in precision agriculture – comparing remote sensing and in situ analyses. *Bulgarian Journal of Agricultural Science*, 30(1), 11–16.

2023 Hagos, Y.G., Andualem, T.G., Sebhat, M.Y., **Kebede, E.A.** (2023). Soil erosion estimation and erosion risk area prioritization using GIS-based RUSLE model and identification of conservation strategies in Jejebe watershed, Southwestern Ethiopia. *Environ Monit Assess* 195, 1501. https://doi.org/10.1007/s10661-023-12136-2

2022 Hagos Y.G., Andualem, T.G., Yibeltal, M., Malede, D.A., Melesse, A.M., Teshome, F.T., Bayabil, H.K., **Kebede, E.A.,** Demissie, E.A., Mitku, A.B. (2022). Assessment of Agricultural Land Suitability for Surface Irrigation Using Geospatial Techniques in the Lower Omo-Gibe Basin, Ethiopia. *Water* 14, 3887. https://doi.org/10.3390/w14233887

Kebede E.A., Vasileva, S.V., Bojinov, B., Dengiz, O. (2022). Comparing Remote Sensing and In Situ Analyses on Assessing the Phenology of Test Wheat Plants as Means for Optimizing Data Collection in Precision Agriculture. https://doi.org/10.21203/rs.3.rs-2160460/v1 **(Preprint)**

2019 **Kebede, E.A.,** Kebede, A. (2019). A Comparison of Hydrological Models Under Climate Change on the Water Resources of Megch River Catchment, Abbay Basin, Ethiopia, 2019. *J. Natur. Sci. Res.* **9,** 20-30.

2017 **Kebede EA,** Kebede A. (2017). Assessment of Climate Change Impacts on the Water Resources of Megech River Catchment, Abbay Basin, Ethiopia. *Open Journal of Modern Hydrology* **7,** 141-152. https://doi.org/10.4236/ojmh.2017.72008

Manuscripts Under Preparation and Review

2025 **Kebede, E.A**., Ali, T., Danilo, D., Chiarelli, Hartman, S., Kummu, M., Mehta, P., Kevin, O., Brian D. R., Rulli, M.C., Tuninetti, M., Brauman, K.A., Deng, Q., Jägermeyr, J., Marston, L., Mekonnen, M.M., Ray, D.K., Rosa, L., Siebert, S., Xie, Davis, K.F. (2025). Global and Local Risks of Rising Water Scarcity to Food Production and Supply. *Science Advances.* (In Prep)

Kebede, E.A., Ali, T., Danilo, D., Chiarelli, Hartman, S., Kummu, M., Mehta, P., Kevin, O., Brian D. R., Rulli, M.C., Tuninetti, M., Brauman, K.A., Deng, Q., Jägermeyr, J., Marston, L., Mekonnen, M.M., Ray, D.K., Rosa, L., Siebert, S., Xie, Davis, K.F. (2025). The determinants of persistent economic water scarcity. *Nature.* (In Prep)

Kebede, E. A., Laboy, G., Olaya, P., Taufer, M., Michael, H., Bhimani, K., Davis, K.F.(2025). A High-Resolution Global Irrigated Area Dataset for the 21st century Using a Combined Remote Sensing and Machine Learning Approach. *Nature Scientific Data. (Under review)*

Kebede, E.A., Hrozencik, A., Marston, L., Van Meter, K., Wei, D., Davis, K.F. Optimizing cropland conservation payments to minimize nitrogen surplus in the Mississippi River Basin. *Environmental Research Letters.* (Under review)

INVITED TALK

2025 **Kebede, E.A.** (2025). Advancing High-Resolution Irrigation Mapping with Open-Source Data and Machine Learning, Global Computing Laboratory, University of Tennessee. Virtual (Invited). https://www.youtube.com/watch?v=9sVVX7BcWsg

Davis KF, **Kebede, E.A.** (2025). The role of irrigation for sustainable and resilient food systems, Oral Presentation. Global Water Security Center. University of Alabama. Virtual (Invited).

Davis KF, **Kebede, E.A.** (2025). The role of irrigation for sustainable and resilient food systems, Oral Presentation. Land and Carbon Lab. World Resources Institute. Virtual (Invited).

2024 Davis KF, **Kebede, E.A.** Khan B, Mehta P, Sarwar A. (2024) Towards sustainable and resilient food-water systems, Oral Presentation. AGU Global Environmental Change Early Career Award Webinar Series. Virtual (Invited).

CONFERENCE PRESENTATIONS

2024 **Kebede, E.A.,** Ali, T., Danilo, D., Chiarelli, Hartman, S., Kummu, M., Mehta, P., Kevin, O., Brian D. R., Rulli, M.C., Tuninetti, M., Brauman, K.A., Deng, Q., Jägermeyr, J., Marston, L., Mekonnen, M.M., Ray, D.K., Rosa, L., Siebert, S., Xie, Davis, K.F. (2024). Global and Local Risks of Rising Water Scarcity to Food Production and Supply. American Geophysical Union Annual Meeting, December 2024, Washington, DC, United States. (Poster).
https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1582539.

Laboy, G., **Kebede, E. A.,** Olaya, P., Taufer, M., Michael, H., Bhimani, K., Davis, K.F. (2024). High Resolution (30m) Mapping of Irrigated Areas Using Machine Learning. American Geophysical Union Annual Meeting, December 2024, Washington, DC, United States. (Poster).
https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1642187.

Kebede, E.A., Oluoch, K. O., Siebert, S., Mehta, P., Hartman, S., Jägermeyr, J., Ray, D., Ali, T., Brauman, K.A., Deng, Q., Xie, W., Davis, K.F. (2024). A Global Open-Source Dataset of Monthly Irrigated and Rainfed Cropped Areas (MIRCA-OS) for the 21st Century. American Geophysical Union Annual Meeting, December 2024, Washington, DC, United States. (Poster).
https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1581599

2023 **Kebede, E.A.,** Oluoch, K. O., Siebert, S., Mehta, P., Hartman, S., Jägermeyr, J., Ray, D., Ali, T., Brauman, K.A., Deng, Q., Xie, W., Davis, K.F. (2023). A global open-source dataset of monthly irrigated and rainfed cropped areas (MIRCA-OS) for the 21st Century, AgMIP9 Global Workshop, June 2023, New York, United States.
https://agmip.org/wp-content/uploads/2023/11/AgMIP9-Report.pdf

Kebede, E.A., Oluoch, K. O., Siebert, S., Mehta, P., Hartman, S., Jägermeyr, J., Ray, D., Ali, T., Brauman, K.A., Deng, Q., Xie, W., Davis, K.F. (2023). A global open-source dataset of monthly irrigated and rainfed cropped areas (MIRCA-OS) of the 21st century. American Geophysical Union Annual Meeting, December 2023, San Fransico, United States. (Poster).
https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1304785

Kebede, E.A., Hrozencik, A., Marston, L., Van Meter, K., Wei, D., Davis, K. F. (2023). Optimizing cropland conservation payments to minimize nitrogen surplus in the Mississippi River Basin, American Geophysical Union Annual Meeting, December 2023, San Fransico, United States.
https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1329124

2022 **Kebede, E.A**., Crosato, A., Paron, P., Sloff, K. 1D morphological adaptation of Lower Zambezi River to dam construction, EGU General Assembly 2022, Vienna, Austria, May 2022, EGU22-13022. https://doi.org/10.5194/egusphere-egu22-13022

Kebede E.A., Vasileva S.V., Bojinov, B., Dengiz, O. (2022). Comparing Remote Sensing and In Situ Analyses of Test Wheat Plants as Means for Optimizing Data Collection In Precision Agriculture. II International Cappadocia Scientific Research Congress, Cappadocia-Nevşehir, Turkey.

2021 **Kebede E.A.,** Vasileva S.V., Bojinov, B., Dengiz, O. (2022). Artificial intelligence and remote sensing as a tool for sustainable agriculture: A review. International Soil Science Symposium on Soil Science and Plant Nutrition, Samsun, Turkey.
https://www.fesss.org/upload_pic/926d186a1bf668aad5fb8e525b269ca9.pdf

2017 **Kebede, E.A.,** Kebede, A. (2017). A Comparison of Hydrological Models Under Climate Change on the Water Resources of Megch River Catchment, Abbay Basin, Ethiopia. 4th International Conference on the Advancements of Science and Technology (ICAST - 2017), Bahir Dar, Ethiopia. (Poster).

2016 **Kebede, E.A.,** Kebede, A. (2016). Assessment of Climate Change Impacts on the Water Resources of Megech River Catchment, Abbay Basin, Ethiopia. National Conference on Water Use, Recyclability, and Treatment Technology, Haramaya University, Ethiopia.

DATASETS

2025 **Kebede, E.A**, P. Mehta,S. Sibert, S., Davis, K.F. (2025). Global Area Equipped for Irrigation (AEI) for the 21st century. *Github*.

2025 **Kebede, E.A.,** P. Mehta, S. Hartman, Sibert, S., Davis, K.F. (2025). GMIA-NEXT: Next-Generation Global Irrigated Area Mapping Using Remote Sensing. *Sci Data.* (*In Prep*)

2024 **Kebede, E.A.**, Oluoch, K., Siebert, S., P. Mehta, Hartman, S., J. Jägermeyr, D. Ray, T. Ali, K. A. Brauman, Q. Deng, W. Xie, K. F. Davis (2024). A global open-source dataset of monthly irrigated and rainfed cropped areas (MIRCA-OS) for the 21st century. *HydroShare*.
.

FELLOWSHIPS AND AWARDS

2025	University of Delaware Open Data Impact Awards
2023	CUAHSI Hydro Informatics Innovation Fellowship
2022-2026	Graduate Research Assistantship, Department of Geography and Spatial Sciences, University of Delaware, Newark, Delaware
2020-2022	Erasmus Mundus Joint Master's Degree Scholarship, European Union
2019-2021	Nuffic-Orange Knowledge Program Fellowship, the Kingdom of the Netherlands
2015	Haramaya University Master's Thesis Research Grant, Ethiopian Ministry of Education

TEACHING

University of Delaware, United States of America (Winter 2025)

- GEOG 271 - Introduction to Geographic Data Analysis

Debre Tabor University, Ethiopia (2017– 2022)

- Soil and Water Conservation (Fall 2017 and 2018)
- Introduction to Natural Resource Management (Spring 2017 and 2018)

Woldia University, Ethiopia (2012– 2017)

- Surface and Ground Water Hydrology (Spring 2015 and 2016)
- GIS and Remote Sensing (Fall 2015 and 2016)
- Research Method and Experimental Design (Fall 2015 and 2016)
- Irrigation Engineering (Fall 2015 and 2016)
- Farm Machinery (Spring 2012)
- Soil Physics (Spring 2012)
- Introductory Soils (Fall 2012)

Bahir Dar Polytechnic College, Ethiopia (2010– 2012)

- Design of Water Supply System Structures and Construction (Fall 2011 and 2012)
- Design and Operations of Irrigation Structures (Spring 2011 and 2012)

ADVISING AND MENTORING

2023 Gabriel Laboy. Mentor. Mapping of Irrigated Areas Using Machine Learning. Summer Intern at Davis Lab. [Currently a graduate student at Arizona State University, Arizona]

2022 Endalamaw Dessie. Academic advisor and mentor. Erasmus Munudus Joint Master's Degree in Soil Science (emiss) at Ondokuz Mayis University. Student

2020 Ashenafi Tadesse Marye. Mentor. [A PhD student at the State University of New York, New York]

2019 Yonas Gebresilase. Undergraduate thesis advisor. The impact of Land Cover change on the hydrology of the Ribb Watershed. [Currently an MSc student at the University of Dayton, Ohio]

2016 Wudu Abiye. Undergraduate thesis advisor and mentor. Review of the Impacts of Land Degradation on Agricultural Production in Ethiopia. [Currently an Erasmus Mundus MSc student in Europe]

Zinabu Abera, Dabosh Molla, and Atalay Wodaje, Gebrehiwot Welekidan, Genet Burako, and Fkir Kefyalew. Undergraduate thesis advisor. [Graduated and working as an agricultural expert]

2012 Zelalam Regassa Womber. Academic advisor and mentor. [PhD student at the University of Massachusetts Amherst]

ACADEMIC LEADERSHIP & SERVICES

2017-2019	Member of research grant review committee, Guna Tana Integrated Field Research and Development Center, Debre Tabor University, Debre Tabor, Ethiopia
2018-2019	Member of the national conference organizing committee, Debre Tabor University, Debre Tabor, Ethiopia
2015-2017	Member of the Academic Council (AC), College of Agriculture, Woldia University, Woldia, Ethiopia
2012-2013	Interim head of Soil and Water Resource Management Department, Woldia University, Ethiopia
Ongoing	Reviewer: Nature Water, Nature Communications, Nature Scientific Data, and other peer-reviewed outlets

FUNDED PROJECTS

2023 **Kebede, E.A (**Principal Investigator). A Global Dataset of Monthly Irrigated and Rainfed Cropped Areas (MIRCA) for the 21st century. The proposal was submitted to the CUAHSI Hydroinformatics Innovation Fellowship. Status: (**$5,000**).

2019 Wassi, H.M., Addise, M.B., **Kebede, E.A.**, Gelaye, T.M., Mebrat, W., Alemu, A. (Co-Principal Investigator). Participatory Eco-Hydrology Project on the Gumara Catchment, Upper Blue Nile Basin, Ethiopia. The proposal was submitted to the Ethiopian Ministry of Water Resources. **(1 Million ETB /40,000 USD).**

2018 **Kebede, E.A.,** Addisse, MB, Abiyu, A. (Principal Investigator). Improving Agricultural Water Productivity in the Guna Tana Watershed. The proposal was submitted to the Debre Tabor University Guna Tana Integrated Field Research and Development Center. **(500,000 ETB /18518 USD).**

2017 **Kebede, E.A.** (Principal Investigator), Gebrie, T., Getachew, G., Addise, MB. Hydrodynamic Modeling of the Upper Ribb Catchment for Increased Sustainability of Reservoirs through Community-Managed Catchments. The proposal was submitted to the Debre Tabor University Guna Tana Integrated Field Research and Development Center. **(300,000 ETB /11100 USD).**

SKILLS

Hydrological and Hydraulic Modeling
HEC-RAS | HEC-HMS| SWAT | GR4J | HBV-Light | MIKE-SHE | MIKE-11

GIS and Remote Sensing

ArcGIS | QGIS | Google Earth Engine | Erdas Imagine| ENVI| SNAP

Data analysis tools
Python | R| Machine Learning| Deep Learning

Crop Water Productivity and Other Agricultural Models
Cowpat | AquaCrop |RETC-Soil Water Potential Model |FAO-WAPOR Model| WEAP

GitHub account: https://github.com/EndiKebede

AFFILIATIONS

American Geophysical Union
European Geosciences Union
International Water Resources Association
American Water Resource Association
National Ground Water Association (US)

CERTIFICATIONS (SELECTED)

2022 Introduction to Remote Sensing for Catchment and Water Resource Management. https://openlearning.unesco.org/certificates/0cdbdaaefd684568aed1f191569cdc03

2021 Retrieving, Processing, and Visualizing Data with Python. University of Michigan. https://www.coursera.org/account/accomplishments/certificate/EFVBG ZNXT5EB

2019 Introduction to GIS for Water Science and Engineering. IHE Delft Institute for Water Educations, Delft, the Netherlands. http://changelog.qgis.org/en/qgis/certificate/QGIS-1567/

MEDIA

2025 Research featured in UDaily, University of Delaware Global Crop Data

2024 Research featured in UDaily, University of Delaware. Global Food Production Data Scarcity

Research featured on Phys.org. The study looks at challenges facing global food production data

Research featured on the Cornell College of Agriculture and Life Sciences. New Study Highlights Challenges in Global Food Production Data

2023 Featured in UDaily, University of Delaware. Solving Water Scarcity