Tesfa Worku Meshesha
Research (data) Scientist
Hydrology and Ocean Ecology lab
Goddard Space Flight Center, Greenbelt
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EDUCATION

PhD: Indian Institute of Technology Roorkee *July 2014 – October 2018*

- Degree: Hydrology & Watershed Management
- Dissertation: Modelling hydrological and sediment responses to Land use and climate variability (Grade=Excellent)
- Website: https://www.iitr.ac.in

MSc: Addis Ababa University, Ethiopia *September 2010 – July 2011*

- Degree: Water Resources Engineering and Management
- Thesis: Analysis of the hydrological process from a watershed (Grade = Very Good)
- Academic status: Completed
- Website: http://www.aau.edu.et

BSc: Mekelle University, Ethiopia *September 2005 – July 2009*

- Bachelor's degree
- Academic status: Completed
- Website: http://www.mu.edu.et/

RESEARCH EXPERIENCE

Assistant Research Scientist *August 2024- present*

Goddard Space Flight Center, Greenbelt, NASA, Hydrology and Ocean Ecology Lad, Maryland, USA.

- Focused on modelling on terrestrial and biosphere model (Ecosystem Demography model) combined with the Land-Use Harmonization dataset provides fluxes of carbon and nutrients from land to rivers under varying land use and land cover change scenarios.
- Modelling Carbon processes
- Modelling Organic carbon transport, processes, and its impact on water quality and aquatic ecosystems.

Assistant Project scientist *March 2023 – July 2024*

University of California Merced, College of engineering, Department of civil and environmental engineering, Merced, California, USA

- Focused on modelling an impact of wildfire on surface runoff, sediment load transport, and turbidity, and modelling the overall impacts on water quality water quality and quantity and impact of climate change on water resources.
- Advance the use of artificial intelligence to support actionable decisions to inform and support a

climate resilient water future for agriculture and ecosystems through prediction, optimization, and data-enabled decision support.

- *Hydrological model modification for water quality modelling in watersheds and impact of climate change on water resources.*

Postdoctoral Associate *January 2021-February 2023*

City university of New York and New York City Department of Environmental Protection (NYCDEP), New York, USA

- Developed climate resilience land use and management practices for an integrated framework to improving watershed management planning and ecosystem services.
- water quality modelling in watersheds and impact of climate change on water resources.
- Applying process-based models to study physical and biochemical processes associated with source, transport, and fate of nutrients in agricultural and grazing lands.
- Investigated machine learning and semi-quantitative modeling approaches to map gully erosion susceptible areas in different landscape and climate regions.
- Evaluated the impact of land use and management practices (bio-physical, agronomic, and soil amendment) on runoff, sediment yield, nutrient outflows, and crop yield by integrating field observation and hydrological modeling.
- Investigated progress and challenges in sustainable land management initiatives towards sustainable ecosystems worldwide (review research).

Postdoctoral researcher *March 2019-June 2020*

Athabasca University, Faculty of Science and Technology, Canada

- Modelling framework of integrated terrestrial and aquatic systems for Athabasca River Basin using Soil and Water Assessment Tool (SWAT), modifying (using FOFRTRAN and Python) hydrological model to model water quality and supply
- Modify hydrological modelling to develop best management practices for sustainable ecological development by quantifying stream discharge, sediment, runoff, greenhouse gasses emissions, biogeochemical process (pollutant loads), quantifying soil O2 emission, development of a nitrous oxide and pH sub-routine for the SWAT model, hydrological modelling characteristics and climatic change scenarios in the Athabasca River Basin, Canada
- Investigated impacts of climate change on hydrology and water resources
- Development of long-term climate change projections for water planning
- development of long-term driving data sets for hydrologic modelling studies, data synthesis and analysis in statistical and hydrological modelling.

Assistant Professor *September 2017 – November 2022*

Debre Behan University, Department of Waters resources and irrigation management

- Evaluated changes in ecosystem service values due to land use/land cover changes induced by human activities in contrasting agro-ecological environments.
- Evaluated lag time and time of concentration estimation methods and analyzed the impact of changes in land use and management practices on the lag time of peak flows for tropical watersheds of Ethiopia.
- Characterized shallow groundwater in hillslope aquifers using isotopic signatures in the Blue Nile basin, Ethiopia.
- Examined the effect of subsurface water level on gully headcut retreat in tropical highlands of Ethiopia.
- Monitored streamflow and weather stations in different agroecological environments.
- Conducted fieldwork to present and introduce best land management practices to the stakeholders and farmers.
- Evaluated the impact of land use and management practices (bio-physical, agronomic,and soil amendment) on runoff, sediment yield, nutrient outflows, and crop yield by integrating field observation and hydrological modeling.
- Investigated progress and challenges in sustainable land management initiatives towards sustainable ecosystems worldwide (review research).

Doctoral Degree Researcher (Ph.D.) *July 2014 - October 2018*

Indian Institute of Technology Roorkee, Department of Water resources Development and management

The focus area of doctoral degree dissertation is *Hydrological modelling, climatic modelling, Atmospheric sciences, land surface modelling, GIS and Remote Sensing, integrated water resources management, and climate changes. More specifically:*

- Explored land use/land cover changes, drivers, and their implications in contrasting agroecological environments using very high-resolution remote sensing data andground truth points.
- Investigated the long-term hydrological responses to land use/land cover change and climate variability in contrasting agroecological environments under limited data conditions.
- Analysis of long-term gully dynamics and morphological characteristics in different agroecological settings using very high-resolution remote sensing data.
- Examined effects of land use and topographic position on soil organic carbon and totalnitrogen stocks in different agroecological environments in Ethiopia

Graduate Student *September 2010 – July 2011*

Addis Ababa University, Ethiopian Institute of Water Resources, Addis Ababa, Ethiopia

- Analyzed the hydrological process (flow, soil moisture, and groundwater level) by integrating HBV hydrological model and measured data in the small Beressa watershed in Nile River Basin, Ethiopia.
- Established flow, groundwater level, and soil moisture sensors on different landscapesof the watershed in Nile River Basin, Ethiopia

- Measured flow velocity using a flow current meter at streamflow monitoring stations.
- Monitored and collected hydrometeorological weather stations in the watershed of theNile River basin, Ethiopia.
- Involved in different hydrological models (e.g., SWAT, and ArcGIS and Remote sensing application) training.

PUBLICATIONS

Links:

Googlescholar: https://scholar.google.co.in/citations?user=C5UML0oAAAAJ&hl=en
LinkedIn: *https://www.linkedin.com/feed/?trk=404_page*
ResearchGate: https://www.researchgate.net/profile/Tesfa_Meshesha4

1074 *total citations in Google Scholar, updated on October 06, 2025*
902 *total citations in ResearchGate, updated on October 06, 2025*

Peer-reviewed Publications

24. Abebe, T.G., **Meshesha, T.W.,** Lemma, E. and Tesfay, F., 2025. Determination of tolerable soil loss limit using quantitative biophysical model: a case study in Andit Tid watershed, central highland of Ethiopia. *Environmental Monitoring and Assessment*, *197*(5), p.506. IF= 3.

23. Abebe, T.G., Lemma, T.M. and **Meshesha, T.W.,** 2025. Exploring best soil conservation practices using the tolerable soil loss limit in central highland of Ethiopia: A case study of Andit Tid watershed. *International Soil and Water Conservation Research*. IF= 7.3.

22. **Tesfa W. Meshesha**, Amanda M. Lopez, Christine M. Lee, Erin L. Hestir, Thomas C Harmon, Ibrahim N. Mohammed, 2025. The effects of wildfire on watershed processes: A model-based comparison of two watersheds. Journal of Hydrology: Regional studies.

21. Amanda M. Lopez, **Tesfa W. Meshesha**, Christine M. Lee, Ibrahim N. Mohammed, Erin L. Hestir, Thomas C. Harmon, Dulcinea M. Avouris, 2025. Woolsey Fire Impacts on Coastal Water Quality in Southern California.

20. **Tesfa W. Meshesha**, Andargachew M. Alemu and Yilma Sileshi, 2023. Water-hydropower- irrigation trade-off analysis over Abbay River basin: Implications for sustainable future water resource development. *Submitted to Journal of Hydrology: Regional studies*. IF= 4.7.

19. Shukla, S., **Meshesha, T.W.,** Sen, I.S., Bol, R., Bogena, H. and Wang, J., 2023. Assessing Impacts of Land Use and Land Cover (LULC) Change on Stream Flow and Runoff in Rur Basin, Germany. *Sustainability*, *15*(12), p.9811. **IF= 3.9.**

18. Melaku, N.D., Wang, J. and **Meshesha, T.W.,** 2022. Modeling the Dynamics of Carbon Dioxide Emission and Ecosystem Exchange Using a Modified SWAT Hydrologic Model in Cold Wetlands. *Water*, *14*(9), p.1458. **IF= 3.103.**

17. Andargachew M. Alemu, Yilma Seleshi and **Tesfa W. Meshesha**, 2022. Modelling the spatial and temporal availability of water resources potential over Abbay river basin, Ethiopia. Journal of Hydrology: Regional Studies, volume 44, page 101280. https://doi.org/10.1016/j.ejrh.2022.101280. **IF= 4.7**.

16. **Meshesha, T.W.,** Wang, J., Melaku, N.D. and McClain, C.N., 2022. Modelling groundwater quality of the Athabasca River Basin in the subarctic region using a modified SWAT model. *Scientific Reports*, *11*(1), pp.1-12. **IF=4.38.**

15. Pandey, B.K., Khare, D., Kawasaki, A. and **Meshesha, T.W.,** 2021. An integrated approach to simulate hydrological responses to land use dynamics and climate change scenarios employing scoring method in upper Narmada basin, India. *Journal of Hydrology*, p.126429. https://doi.org/10.1016/j.jhydrol.2021.126429. **IF=6.708**.

14. Wang, J., Kumar Shrestha, N., Aghajani Delavar, M., **Worku Meshesha, T.** and Bhanja, S.N., 2021. Modelling Watershed and River Basin Processes in Cold Climate Regions: A Review. *Water*, *13*(4), p.518. **IF= 3.103**.

13. **Meshesha, T.W.,** Wang, J. and Melaku, N.D., 2020. Modelling spatiotemporal patterns of water quality and its impacts on aquatic ecosystem in the cold climate region of Alberta, Canada. *Journal of Hydrology, p.124952*. https://doi.org/10.1016/j.jhydrol.2020.124952. **IF=6.708**.

12. Melaku, N.D., Wang, J. and **Meshesha, T.W.,** 2020. Improving hydrologic model to predict the effect of snowpack and soil temperature on carbon dioxide emission in the cold region peatlands. *Journal of Hydrology*, p.124939. IF=5. 6.708. https://doi.org/10.1016/j.jhydrol.2020.124939.

11. **Meshesha, T.W.,** Wang, J. and Melaku, N.D., 2020. A modified hydrological model for assessing effect of pH on fate and transport of Escherichia coli in the Athabasca River basin. *Journal of Hydrology*, *582*, p.124513. https://doi.org/10.1016/j.jhydrol.2019.124513. IF=6.708.

10. **Tesfa W.,** Deepak K., Ermias S., Asirat T., Desalew T., Mihret D. 2019. Conceptual analysis of urban water management considering climate change scenarios. *An International Scientific Journal*, 28, 51-66.

9. **Worku, T.,** Khare, D. and Tripathi, S.K., 2017. Modelling runoff–sediment response to land use/land cover changes using integrated GIS and SWAT model in the Beressa watershed. *Environmental Earth Sciences*, *76*(16), p.550. https://link.springer.com/article/10.1007/s12665-017-6883-3. IF= 2.784.

8. Sisay, E., Halefom, A., Khare, D., Singh, L. and **Worku, T.,** 2017. Hydrological modelling of ungauged urban watershed using SWAT model. *Modelling Earth Systems and Environment*, *3*(2), pp.693-702. https://link.springer.com/article/10.1007/s40808-017-0328-6.

7. Halefom, A., Sisay, E., Khare, D., Singh, L. and **Worku, T.,** 2017. Hydrological modelling of urban catchment using semi-distributed model. *Modelling Earth Systems and Environment*, *3*(2), **pp.683-692.** https://link.springer.com/article/10.1007/s40808-017-0327-7

6. **Worku, T.,** Khare, D. and Tripathi, S.K., 2018. Spatiotemporal trend analysis of rainfall and temperature, and its implications for crop production. ***Journal of Water and Climate Change.*** https://doi.org/10.2166/wcc.2018.064. If=1.9.

5. **Meshesha, T.W.,** Tripathi, S.K. and Khare, D., 2016. Analyses of land use and land cover change dynamics using GIS and remote sensing during 1984 and 2015 in the Beressa Watershed Northern Central Highland of Ethiopia. ***Modelling Earth Systems and Environment*, *2*(4), p.168.** https://link.springer.com/article/10.1007/s40808-016-0233-4

4. **Worku, T.,** Tripathi, S.K. and Khare, D., 2017. Household level tree planting and its implication for environmental conservation in the Beressa Watershed of Ethiopia. *Environmental Systems Research*, *6*(1), p.10. https://link.springer.com/article/10.1186/s40068-017-0087-4.

3. **Worku, T.** and Tripathi, S.K., 2015. Watershed Management in Highlands of Ethiopia: A Review. *Open Access Library Journal*, *2*(06), p.1. https://www.scirp.org/html/68469_68469.htm.

2. **Meshesha, T.W.** and Tripathi, S.K., 2016. Farmer's perception on soil erosion and land degradation problems and management practices in the Beressa Watershed of Ethiopia. *Journal of Water Resources and Ocean Science*, *5*(5), pp.64-72.

1. **Meshesha, T.W.** and Khare, D., 2019. Towards integrated water resources management considering hydro-climatological scenarios: an option for sustainable development. *Environmental Systems Research*, *8*(1), p.5. https://link.springer.com/article/10.1186/s40068-019-0134-4.

CONFERENCES, WORKSHOPS, AND PRESENTATIONS

13. **Tesfa W. Meshesha**, Erin L. Hestir, Christine M. Lee and Ibrahim N. Mohammed, Thomas C. Harmon, Amanda M. Lopez. Watersheds dynamics following wildfires: implications on hydrologic responses AGU fall meeting, December 9-13, 2024, Washington DC.
12. **Tesfa W. Meshesha**, Cecile S. Rousseaux, Louise Chini, Blake Clark, Stephen Crooks, George Hurtt, Michael Mehari and Stephanie Schollaert. Integrating lateral carbon fluxes into global ocean carbon Estimates, AGU fall meeting, December 9-13, 2024, Washington DC.
11. Lopez, A.M., Hestir, E.L., Avouris, D. M., Lee, C.L., Berberian, L., Mohammed, I.N., Harmon, T.C., Cavanaugh, K., Bell, T., Jepsen, S., **Tesfa W. Meshesha**. Wildfire Impacts on Watershed Transport of Carbon to Coasts NASA Carbon Cycle and Ecosystems Joint Sciences Workshop; 2023 May 8-12; College Park, MD.
10. Lopez, A.M., Hestir, E.L., Avouris, D. M., Lee, C.L., Mohammed, I.N., Harmon, T.C., **Tesfa W. Meshesha**, Berberian, L. Tools to Assess Coastal Water Quality Impacts from Wildfires California Wildfires Conference. 2023 Oct 24-26; Simi Valley, CA.
9. **Tesfa W. Meshesha,** Amanda M. Lopez, Christine M. Lee, Ibrahim N. Mohammed, Erin L. Hestir, Thomas C. Harmon, Dulcinea M. Avouris, 2023. Wildfire Resilience for Coastal Communities: Reducing Impact on Coastal Waters & Infrastructure. California Wildfire conference, Simi valley, California from October 24 – October 26, 2023.
8. **Tesfa W. Meshesha,** Radha K., Bhaskar R., Deepak K., Ayush C., Brij K. (2018). Hydrological simulation of an ungauged catchment (kharun watershed) using swat. international conference on "Sustainable Technologies for Intelligent Water Management, IIT ROORKEE.
7. Arpit C., Radha K., Bhaskar R., Deepak K., Ayush C., Brij K., **Tesfa W. Meshesha** (2018). Prediction of Monthly Runoff and Sediment for Agricultural Watershed using SWAT. International Conference on Sustainable Technologies for Intelligent Water Management (STIWM), IIT ROORKEE.
6. **Tesfa W. Meshesha,** Deepak K., 2018. Towards Integrated Water Resources Management considering hydro-Climatological Scenarios: An Option for Sustainable Development. First annual conference from June 19-20, 2018, Debre Berhan University, Debre Berhan, Ethiopia.

5. Lakhwinder S. Deepak K. and Ayush C., **Tesfa W. Meshesha** (2018). Impact of Urban landuse change on Discharge – A Case Study of Vadodara, India, 5th swat (soil & water assessment tools) conference & workshop in southeast & east Asia (SWAT seea v), at Kuala Lumpur, Malaysia.
4. **Tesfa W. Meshesha,** 2018. Climate Change Variability (Rainfall and Temperature) and Its Implication on Crop Production. First annual conferences from June 19-20, 2018, Debre Berhan University, Debre Berhan, Ethiopia.
3. **Tesfa W. Meshesha,** S.K. Tripathi 2018. Towards Integrated Water Resources Management considering hydro-Climatological Scenarios: An Option for Sustainable Development. 8th national conference from 17-19 May 2018 Dilla University, Ethiopia.
10. **Tesfa W. Meshesha,** 2018. Trend Analysis of Rainfall and Temperature Using Statistical Approach and Its Implication on Crop Production in Beressa Watershed, Ethiopia. The 1st international conference from 19-21 June 2018 Semera University, Semera Ethiopia.
1. **Tesfa W. Meshesha,** Khare, D. and Tripathi, S.K., 2018. Modelling runoff–sediment response to land use/land cover changes dynamics. The 7th annual symposium on 28th July 2018 Desalegn Hotel, Addis Ababa, Ethiopia.

Recent talk (guest lecture) given to institute.

1. Organic carbon model development and its impact on water quality. 11th December 2021, Department of civil engineering at Birla institute of technology and science Pilani, Dubai campus (BPDC).
2. Sustainable water resources management under climate change. 12th December, Department of civil engineering at Birla institute of technology and science Pilani, Dubai campus (BPDC).

Administrative and Institution Level Responsibilities

- Head department of water resources and irrigation management, September 2014 to June 2014, Debre Berhan University.

SCHOLARSHIP AND GRANT AWARD

2014: Received the "University Grant Commission (UGC)".

2014: Outstanding Teacher's Award-2014 by Debre Berhan University.

2014: Received the Indian **government fellowship program.**

2019: Postdoctoral fellowship, Received the "Athabasca River Basin Research Institute (ARBRI) Balancing development and sustainability in the Athabasca River Basin, Athabasca".

2021: Postdoctoral research associate, Received the "City University of New York and Department of Departmental Protection water quality modelling project."

2023: Research Scientist "kelpfire project"

TEACHING EXPERIENCE

I. **Assistant Professor** *September 2017 – November 2023*

II. **Lecturer** *July 2011 – August 2017*

Academic Institute: Debre Berhan University Department of Water resources and irrigation management

Courses:

- ***Undergraduate courses***: *Hydrology (Surface and groundwater hydrology), Water resources planning and management, Open channel hydraulics, Water resources and environmental management, Climate change and Water resources.*
- ***Postgraduate courses****: Geomorphology, terrain analysis, Integrated water resources management, Surface water hydrology, Floods hydrology and mitigation, Modelling of water systems, fluvial processes.*

Expert Reviewer/Advisor

1. Reviewer (16 papers) for several ISI, SCI and SCOPUS indexed journals including Advance in Meteorology (**IF= 1.491)**, International journal of river basin management (Tylor and Francis), Environmental Earth Science (Springer) (**IF= 2.180**), Earth System Science (Springer) (**IF= 1.646)**, Journal of hydrometeorology (**IF=3.891**), remote sensing (**IF=4.509**), water (**IF=2.544**) and others.

2. Advisor for undergraduate (10), postgraduate (3) students, and Doctoral degree (two continuing)

3. Editorial board membership of Universe Scientific Publishing for Advance in Geoscience.

Digital Skills - Self-Assessment Grid

A. Good command of Microsoft Office™ tools (Word, Excel, PowerPoint, Access)

B. Good commands of Statistics Software (SPSS, STATA), GIS and Remote Sensing, ArcGIS, ArcGISpro, GEE, IRDAS IMAGINE, IDRSI Selva, and Matlab that acquired through training and research.

C. Different hydrological models (SWAT Modell, HEC-RAS).

D. Python, R, FORTRAN C etc.

Certified training:

1. Introduction to Data Science
2. Data Analytics
3. Data Science with R programming.
4. Introduction to Structured Query Language (SQL)
5. Introduction to web development with HTML, CSS, and JavaScript
6. Big data analysis for water related applications.

Driving License

C and D

DECLARATION: I sincerely declare that the facts provided in this CV are true and correct tothe best of my knowledge.