Ammara Talib University of Wisconsin Madison
1415 Engineering Drive, Madison, WI 53706
4134049477
talib@wisc.edu

Google Scholar

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EDUCATION

PhD Candidate Civil and Environmental Engineering University of Wisconsin Madison
06/ 2023
Thesis**:** *Prediction and forecasting of Evapotranspiration (ET) and Ground water elevation (GWE) along with improved parameterization of ET in agricultural lands*

MS Environmental Conservation (Water, Watersheds, and Wetlands)
cGPA-3.93/4
Thesis*: Department of Environmental Conservation University of Massachusetts Amherst, USA*
Thesis: Assessment of impacts of land use land cover (LULC) and climate change on water resources in SuAsCo watershed, Massachusetts
Managing emerging contaminants in watersheds: need for comprehensive, systems-based strategies

BS Earth & Environmental Sciences, College of Earth & Environmental Science, University of the Punjab, Lahore, Pakistan
cGPA-3.78/4
Thesis: *Environmental Impact Assessment of Pan power plant near residential area in Pakistan*
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ACADEMIC WORK EXPERIENCE

09/2018-2023 Research Assistant University of Wisconsin Madison
Duties included: Developing a Hydrologic model for water budget in Central Sands Wisconsin

01/2018-Present Teaching Assistant University of Wisconsin Madison
Duties included: Independent Project (IP) instructor for Introductory Biology (Bio 151, Bio 152). Guiding and preparing students for writing/presenting a scientific paper based on data obtained from meta-analysis as well as data from mentors, address concepts in cellular molecular biology, genetics and mammalian anatomy and physiology.

09/2018-12/2018 Teaching Assistant University of Wisconsin Madison
Duties included: Instructor for Meteorological measurement course (AOS 404). Guiding and preparing students for using instruments such as weather station, CO_2 Tracker, Windsond, DustTrak for meteorological measurements for NSF funded SAVANT project.

07/2015-05/2018 Research Assistant Environmental Fluid Mechanics Lab, Madison WI

09/2012-05/2015 Fulbright Research Fellow, Department of Environmental Conservation University of Massachusetts Amherst, USA

09/2006-08/2011: Science Teacher (Physics, Chemistry) to middle, High school students in Pakistan
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CURRENT RESEARCH

- Forecasting ground water fluctuation under the influence of high-density ground water pumping in Wisconsin.
- Reviewer for premed independent projects (meta-analysis, mentored) for Bio 152 undergraduates.
- Optical coherence tomography (OCT) in patients with Parkinson's Disease (PD), Review (Medical Physics 619: Microscopy of Life, Final Project)

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PREMED CLASSES RESEARCH PROJECTS

09/2022-2023 Optical coherence tomography (OCT) in patients with Parkinson's Disease (PD), Review (Medical Physics 619: Microscopy of Life, Final Project)

06/2022-09/2023 Isolation and characterization of *Exiguobacterium undae* from organic lettuce using physiological and sequence approach (Microbiology 304 lab, Final Project)

06/2022-09/2022 Review of effect of partial cellular reprogramming on liver plasticity and regeneration (Genetics 527: Developmental Genetics for Conservation & Regeneration, Final Project)

01/2022-06/2022 Genome-wide association study (GWAS) and Candidate Associated study in Uruguay Population to identify common and novel susceptibility loci for type 2 diabetes mellitus (T2D) (Population Genetics 633: Final Research Proposal)

09/2021-06/2023 cardiovascular disease (CVD) and Diabetes care disparities among African Americans and Intervention to reduce disparities (Health Communication in the Information Age (LSC617), Communication Arts (612) Race and Health Communication: Final Project)

01/2021-06/2021 Human Papillomavirus & Cancer (Cancer Genetics 662, Final Project)

09/2020-12/2020 Review of Effects of Scoliosis on Pulmonary Functions in Children (Final project for Anatomy & Physiology 338 Human Anatomy Laboratory)

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PUBLICATIONS

1. Talib, **A., Desai, A. R., Huang, J.,** Spatial and Temporal Characterization of Forecasting GW anomalies in Wisconsin Central Sands (WCS) **(in preparation)**

2. **Talib, A.,** Desai, A. R., Huang, J., Improving parameterization of atmospheric emissivity of a regional irrigation scheduling program for evapotranspiration estimation using eddy covariance measurements **(in preparation)**

3. **Talib, A.** and Randhir T. O. (2022) Long-term effects of Land-use Change on Water Resources in Urbanizing Watersheds **Submitted in *PLOS Water***, manuscript # PWAT-D-22-00096

4. Desai, A.R., J. Thom, S. Wiesner, B. Butterworth, N. Koupaei-Abyazani, A. Merrelli, B. Murphy, A. Muttaqin, S. Paleri, **A. Talib**, J. Turner, J. Mineau. (2022). Drivers of decadal carbon fluxes across temperate ecosystems. ***Journal of Geophysical Research: Biogeosciences,*** https://doi.org/10.1029/2022JG007014

5. Ebert, L. **A., Talib,** A., Zipper, S. C., Desai, A. R., Paw U, K. T., Chisholm, A. J., Prater, J., & Nocco, M. A. (2022). How High to Fly? Mapping Evapotranspiration from Remotely Piloted Aircrafts at Different Elevations. ***Remote Sensing,*** *14*(7). https://doi.org/10.3390/rs14071660

6. **Talib, A.,** Desai, A. R., Huang, J., Griffis, T. J., Reed, D. E., & Chen, J. (2021). Evaluation of prediction and forecasting models for evapotranspiration of agricultural lands in the Midwest US. ***Journal of Hydrology***, 126579. https://doi.org/10.1016/j.jhydrol.2021.126579

7. Chatterjee, S., Stoy, P. C., Debnath, M., Nayak, A. K., Swain, C. K., Tripathi, R., Chatterjee, D., Mahapatra, S. S., **Talib, A**., & Pathak, H. (2021). Actual evapotranspiration and crop coefficients for tropical lowland rice (Oryza sativa L.) in eastern India. ***Theoretical and Applied Climatology***, *146*(1–2). https://doi.org/10.1007/s00704-021-03710-0

8. **Talib, A** and T. O. Randhir. 2017. Climate change and land use impacts on hydrologic processes of watershed systems ***Journal of Water and Climate Change*** https://doi.org/10.2166/wcc.2017.064

9. **Talib, A.** and T. O. Randhir (2017), Managing emerging contaminants in watersheds: Need for comprehensive, systems-based strategies, *Sustainability of* ***Water Quality and Ecology***, doi: https://doi.org/10.1016/j.swaqe.2016.05.002.

10. **Talib, A.** and Randhir T. O. (2016) Managing emerging contaminants: status, impacts, and watershed-wide strategies. ***Exposure and Health*** 8:143–158. doi: 10.1007/s12403-015-0192-4

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CONFERENCE PRESENTATIONS

1. Desai, A.R., J. Thom, S. Wiesner, B. Butterworth, N. Koupaei-Abyazani, A. Merrelli, B. Murphy, A. Muttaqin, S. Paleri, **A. Talib**, J. Turner, J. Mineau. (2021) From half-hour to quarter century- Drivers of carbon fluxes across a northern ecosystem tower cluster**,** AGU Fall Meeting 2021, 13-17 December

2. **Talib A**, Desai, A. R. (2020) What have we learned from continuous crop and forest evapotranspiration observations in the Central Sands? Wisconsin Potato Vegetables & Growers Association, Grower Education Conference & Industry Show, Stevens Point, WI, Feb 5, 2020 (invited)

3. **Talib A**, Desai, A. R. (2020) Water Use by Crops and Forest and Improving Irrigation Planning- American Water Resource Association (AWRA) 44th Annual Conference 2020, 12 March

4. **Talib A**, Desai, A. R. (2020) Improving irrigation planning and early prediction for agricultural drought in Wisconsin, AGU Fall Meeting 2020, 07-11 December

5. LA Ebert, AJ Chisholm, J Prater, SC Zipper, **Talib A**, AR Desai, MA Nocco. (2020) How high to fly? Evaluating different elevations for mapping evapotranspiration from remotely piloted aircrafts, American Geophysical Union (AGU) Fall Meeting 2020, 07-11 December

6. **Talib A**, Desai, A. R. (2019) Improving forecasts of crop water demand with direct ET measurements over irrigated fields, Wisconsin Potato Vegetables & Growers Association, Grower Education Conference & Industry Show, Stevens Point, WI, Feb 5, 2019 (invited)

7. **Talib A**, Desai, A. R. (2019) Field-scale mapping and forecasting of water budgets in intensively irrigated agricultural regions through an advanced ensemble modeling framework, American Geophysical Union (AGU), Fall Meeting 2019, 09-13 December

8. LA Ebert, AJ Chisholm, J Prater, SC Zipper, **Talib A**, AR Desai, MA Nocco. (2019) Using remotely piloted aircrafts to evaluate potato water stress in Central Wisconsin**,** American Geophysical Union (AGU), Fall Meeting 2019, 09-13 December

9. **Talib, A**. and Desai, A. R; (2018). Efficacy of Machine Learning Algorithms for Identifying Hotspots of Groundwater Depletion in Intensively Irrigated Agricultural Regions, American Geophysical Union (AGU), Fall Meeting 2018, 10-14 December 2018

10. Nocco, M. A. ; McNamee, E. O. ; Bohman, B. ; **Talib**, A. ; Rosen, C. J. ; Desai, A. R. ; Kern, C. C. ; Kucharik, C. J. ; Twine, T. E. (2018) Pine to Potato Conversion Impacts to Groundwater Recharge in the Northern Great Lakes Region, American Geophysical Union (AGU), 10-14 December 2018

11. **Talib, A.** and Desai, A. R. 2018, Water from ground to sky: New approaches to observing and predicting field to basin scale ET over crops and plantations, Wisconsin Potato Vegetables & Growers Association, Grower Education Conference & Industry Show, Stevens Point, Feb 6, 2018 (invited)

12. **Talib, A.** and Desai, A. R. 2017. Groundwater-Surface water interaction in agricultural watershed that encompasses dense network of High-Capacity wells, **American Geophysical Union (AGU),** Fall Meeting 2017, 11-15 December

13. **Talib, A** and Randhir. 2014. Land Use Land Cover Impacts on Water Quantity and Quality in Watershed Systems, Lombard, Illinois, 69th **SWCS International Annual Conference,** making waves in conservation, our life on land and its impacts on water 27-30 July 2014

14. **Talib, A** and Randhir. 2014. Integrated Assessment of Land Use Land Cover and Climate Change Impacts on Water Quantity and Quality in SuAsCo Watershed System, 2014 **American Water Resource Association (AWRA)** Summer Specialty Conference on Integrated Water Resources Management (IWRM) from theory to application Reno, Nevada June 30- July 2, 2014.

15. **Talib, A** and Randhir. 2014. Climate Change Impacts on Water Quantity and Quality in Watershed Systems, **UCOWR-NIWR-CUAHSI Conference on Water Systems**, Science, and Society under Global Change, at Tuft University Medford, Massachusetts, 18-20 June 2014

16. **Talib, A** and Randhir. 2014. Climate Change Impacts on Water Resources, **Northeast Natural History Conference (NENHC),** Springfield, Massachusetts, 7-9 April 2014

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GENERAL INTEREST HIGHLIGHTS

12/12/2018 Comparing Evapotranspiration on an irrigated potato field and pine plantation: Eddy covariance Flux Towers allow scientists to directly observe changes in plant water use (Page 20-22) https://issuu.com/bctater/docs/1812_standard

05/07/2019 Ways to Measure Evapotranspiration: New technologies make the science of measuring ET a bit more tangible (Page 24-26) https://issuu.com/bctater/docs/1905_standard

03/28/2017 It's not too late to conserve water resources in rapidly urbanizing areas https://phys.org/news/2017-03-late-resources-rapidly-urbanizing-areas.html

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AWARDS/FELLOWSHIPS

1. **Premed Award**, FulMed.org $1000, 9/15/2022

2. **UW Water Resources Institute,** Data-driven groundwater depth and risk forecasting in the Central Sands region of WI for sustainable management**,** $71,499, 7/1/2021-12/31/2022

3. **State of Wisconsin Dept of Natural Resources**, *Evapotranspiration of irrigated crops: Monitoring and data collection*, $15,000, 6/1/2018-10/31/2018

4. **Wisconsin Potato and Vegetation Growers Association (WPVGA)**, Monitoring evapotranspiration in Central Sands farms and forests, $117,012, 7/1/2018-6/30/2023
5. **METER Grant A Harris** instrumentation fellowship, $10,000, 03/15/ 2019
6. **CPEP Seed Grant Award Center of Climate Research,** *Observing Wisconsin Central Sands Water Budget Component Under High Groundwater Demand and a Changing Climate*, $8000, 5/1/2017-8/30/2017

7. **Chancellor's Opportunity Award,** University of Wisconsin Madison $3000, 9/1/2015

8. **Academic scholarship**, University of Massachusetts Amherst $300, 4/30/2015

9. **Fulbright Scholarship** (University of Massachusetts Amherst, USA), $980,00, 9/1/2012-5/30/2015

10. **Merit scholarship for two undergraduate semesters** (College of Earth & Environmental Sciences in Punjab University Lahore, Pakistan), $200, 3/1/ 2007, 5/1/ 2009.

11. **Honors Rank student** (Islamic College Cooper Road, Lahore, Pakistan), May 2004.

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CERTIFICATES

2018-06-25: Neural Networks and Deep Learning, Coursera

2018-07-09: Improving Deep Neural Networks- Hyperparameter Tuning, Regularization and Optimization, Coursera

2018-07-14: Structuring Machine Learning Projects, Coursera

2018-08-04: Convolutional Neural Networks, Coursera

2018-08-23: Sequence Models, Coursera

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WORKSHOPS

2016-01-24: Graduate Assistants' Equity Workshops, Division of Diversity, Equity & Educational Achievement

2016-09-08: Graduate Assistants' Equity Workshops, Division of Diversity, Equity & Educational Achievement

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COMPUTING EXPERTISE

Statistics: I am familiar with the use of deterministic functions, probability distributions, conduct classic one- and two-sample tests, utilize bootstrapping and Monte Carlo randomization procedures, and conduct stochastic simulations for ecological modeling.

Matlab: I am familiar with the use of Advanced Excel, Matlab Array, Loops and Logic plotting, Roots Finding and Linear System, Regression, Interpolation Symbolic, Integration differential Equation Symbolic

EES: Engineering Equation Solver

GIS: ARCGIS I have experience with basic GIS concepts such as spatial data sources and structure

Projections and coordinate systems, data editing and creation, geospatial analysis, habitat modeling, buffer analysis and arc hydro tools.

Remote sensing: I have carried out enhancement and correction of raster (LANDSAT) data, landuse landcover change detection, and error analysis of classified images.
Simulation:

STELLA: Skills in systems modeling and optimization to get insights into complex natural resources and ecosystems using a systems approach, to quantify and evaluate dynamic inter-linkages between and within biotic, abiotic, and socio-economic components of an ecosystem.

BASINS /HSPF: Calibration, validation and scenario analysis to assess the land use land cover (LULC) and climate impacts on hydrological resources.

SWAT/SWATCUP: Calibration/validation, uncertainty analysis

Modflow: Ground water Modeling

Hydrocad: Pond Design

Python: Data science and Machine Learning projections and coordinate systems, data editing and creation, geospatial analysis, habitat modeling, buffer analysis and arc hydro tools.

R: Data analysis, web design

Remote sensing: I have carried out enhancement and correction of raster (LANDSAT) data, landuse

High-throughput computing (HTC): Iteration of machine learning algorithms, flux tower data Ecostress and SMAP satellite data

Machin Learning/Artificial neural Network/Deep learning: Artificial neural network such as feedforward and recurrent neural network (LSTM), Random Forest

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LEADERSHIP ROLE

01/2021-Present: Member at "Outreach committee at water resource engineering (WRE)

The purpose of the organization, "Outreach Committee," is to organize events such as Engineering Expo, WI Science Festival, etc. I was also involved in helping plan/organize water resource engineering engagement in already established University & community events (e.g., Water@UW poster session). One current goal is to update the departmental website. During department seminars, I had the honor to introduce other graduate students before their talk that helped me with my communication skills.

01/2021-Present: Member at "Cardiac on campus" organization

“Cardiac on Campus” organizations offer opportunities to network with health professionals, scientists, and volunteers and to address disparities and biases at work. I believe leaders inspire, assemble, and encourage teams, ensuring that the end goal remains in sight. To achieve success, it is necessary to nurture and discipline; it involves listening to the opinions of many while also making unpopular calls and knowing when to follow. Leadership, delegation, and support that is guiding but not oppressive, are skills I learned from coordinating volunteers and collaborating with professors.

01/2018-Present: Teaching Assistant University of Wisconsin Madison (Bio 151, Bio 152 lab, AOS 404 lab)

6-8/ 2011: Volunteer intern at Waste busters Pakistan Lahore**:** At Waste Busters, I translated poems and stories in the "Waste Busters Environmental Handbook" for primary school children from English to Urdu to inform them about their responsibilities. Considering children are growing up in a consumer-oriented society, this experience was essential to make them aware of reusing material and protecting the environment.

09/2006-08/2011: Science Teacher (Physics, Chemistry) to middle, High school students in Pakistan

6-8/2010: Volunteer intern at Environmental Protection Agency (EPA), Pakistan

At EPA, I performed Environmental Impact assessments of industrial development in residential areas. This internship helped me think about the consequences of power plants on the health of communities living adjacent to industrial sites.

6-12 2009: Volunteer intern at Greenlays clean Pakistan

I was part of conducting waste audits to estimate the value of recycling waste at Greenlays in our school.

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PHYSICIAN SHADOWING

02/2020-2023: Web shadowers and Tele shadowing (Virtual Shadowing)

12/2023-Present: Physicians shadowing at UW health

I have shadowed anesthesiologists, endocrinologists, physiatrists, and many other specialties.
Dr. Janiczek, an anesthesiologist, explained about intubating patients while taking care of patient's vitals and then later reverse neuromuscular blockade in such a way that was easy to grasp.
I learned about using a catheter to remove the clot in pulmonary and uterine artery embolism cases for interventional radiology. It showed me there are various tools for guidance (CT, MRI), access (needles, wires), and navigation (catheters) in the human body. I learned how life in interventional radiology could be highly variable, with private practice (e.g., sub-specialization pediatrics, neuro, cosmetic).

Shadowing physicians from various specialties allowed me to observe their fast-paced, demanding, and intellectually challenging daily routines. I learned alongside an orthopedic surgeon in an operating room and outpatient clinic. The physicians I followed presented well-researched diagnosis plans to their patients, collaborated within the team, and were healthcare leaders. After shadowing a medical team for 12 hours, I became familiar with some of the more demanding responsibilities and daily sacrifices of physicians. I learned that chronic diseases have both social and biological determinants.

During patient interactions, I observed the importance of non-verbal communication and how body language plays just as important as spoken words. Simple things such as body language, tone of voice, eye contact, and manners, especially when listening to patients and providing comfort, can only be learned through experience. As I watched each patient share their story, each brought their own personality, and each came from a different background, I was fascinated by how advice was received. As a result of these experiences, I came to appreciate the importance of developing patient-centered care. As a result of my experience, I am confident that I will be able to develop stronger relationships with my patients in the future.

02/2020-03/2020: Clinical Shadowing Timothy Kamp, MD, PhD, Cardiologist at UW health

I observed Dr. Kamp in an outpatient clinic. Dr. Kamp's clinical activities include general consultative cardiology and cardiac care for patients with neuromuscular disorders and muscular dystrophies.

09/2019-01/ 2020: Clinical Shadowing Dr. Baer MD, PhD, Orthopedic surgeon/Sports medicine at UW health

I shadowed Dr. Baer in the operating room as well as in the outpatient clinic. I observed Dr. Baer performs diagnoses and treats ailments affecting joints, bones, and muscles. Some of his patients had sports injuries and degenerative infections. During my shadowing, I took notes and asked questions related to procedures.

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CLINICAL VOLUNTEER EXPERIENCE

11/2022-Present Volunteer in the General Surgery department at UW University of Wisconsin Hospital and clinics
08/2021-Present Volunteer Crisis Counselor at Crisis Text Line

12/2020-Present Volunteer Listener for emotional support at 7 cups emotional health service and online therapy provider

This experience as a listener enabled me to develop reflection skills, labeling emotions, and empathy. It showed me that addressing the patient's psychological needs can be just as important as the physical. It was lovely to read genuine reviews from members (especially schizophrenia and chronic pain patients), and I was empowered each time a member mentioned that I helped them by talking. When I listened to some members with depression, I saw the same pattern of symptoms that psychiatrists used for diagnosis but noticed how heterogeneously they manifest. This diversity of symptoms asks for precision medicine that can be elucidated via thorough knowledge of physiology & genetic/epigenetics.

I learned about clinical skills in the ER within the context of empowering patients. Working on a healthcare team instilled a strong sense of conflict resolution, problem-solving, compromising, and staying true to my values. My experience includes soothing people in times of grief, helping indecisive people make decisions, soothing impatient people, and comforting people in physical illness. As a result of these experiences, I learned that I am an effective communicator and a good listener, capable of adapting to diverse personalities, group dynamics, mental anguish, and physical sickness. Therefore, I tailored each appointment to meet the individual's unique needs.

09/2019-03/10/2020 Volunteer in the Emergency Room (ER) at UW health
As a volunteer in the ER, I interacted with the friends and family of patients. Under the nurse's direction, I answered patient calls and facilitated communication between providers and family members. I directed families of patients to respective waiting areas. I maintained a supply of blankets, warmers, IV fluids, and masks. I helped my patients by talking and listening to them, playing with kids, providing snacks, coffee, and other services.

CLINICAL PAID EXPERIENCE

07/2016-09 2016: Caretaker/Home Health Aide for Patients with Parkinson and cerebral Palsy

> I cared for a 50-year-old patient with Parkinson's and her sixteen-year-old daughter with cerebral palsy (CP). My role was to cook for them, feed them, cloth them and get them ready for bed.

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HOBBIES

Zumba and yoga: I started doing Zumba and hot yoga in school to decompress. These activities kept me grounded during stressful times and helped me strive to improve.

Skincare: Skincare is an interest of mine because I have chronic skin issues (cystic acne and eczema). I also enjoy learning about non-invasive antiaging regimes, e.g., hyaluronic acid, micro-needling, microcurrent and LED masks, and it gives me confidence.

Meal prep: I like to try vegan recipes I find online and from meal kits (e.g., purple carrot). Meal prep biweekly while listening to the Weight Loss Champion Chuck Carroll podcast has been very therapeutic.

Henna painting: I like to paint my and my friend's hands with beautiful paisley and floral designs formed from a thick brown paste. My friends loved my designs. I look forward to creative designs and having fun painting hands with nothing permanent.

Podcast: I listen to David Sinclair's podcast, a geneticist, about longevity, where he talked about the link between sirtuins, fasting, and the insulin pathway. I am interested in recent research about Resveratrol and nmn and its role in longevity, so I follow blog posts and listen to the experiences of people who are taking them.

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