ZADA M. TAWALBEH

AJLOUN NATIONAL UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
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SCOPUS, GOOGLE SCHOLAR, RESEARCH GATE

PERSONAL DETAILS

- **NATIONALITY:** United States of America and Jordan
- **DATE OF BIRTH:** May 22, 1980
- **PLACE OF BIRTH:** Irbid, Jordan
- **MARITAL STATUS:** Married
- **NUMBER OF CHILDREN:** Two sons (Hashem and Omar) and one daughter (Alyne).

OBJECTIVE

To contribute to a dynamic academic and research environment through integrated work in sustainable water resource management and geospatial analysis. With a Ph.D. in Civil Engineering– specializing in water resources and complemented by a minor in Geographic Information Systems (GIS)– I bring advanced expertise in developing data-driven, interdisciplinary solutions to optimize water use, particularly in arid and water-stressed regions. In parallel with my research, I am deeply committed to excellence in teaching, curriculum development, and student mentorship, with the goal of preparing future engineers to address complex environmental and sustainability challenges through innovative applications of civil engineering.

EDUCATION

NEW MEXICO STATE UNIVERSITY (NMSU), LAS CRUCES, NM, USA.

1. **PH.D. (WITH GPA 3.97)**, Civil Engineering - Water Resources, August 2024
   - **DISSERTATION ENTITLED:** *Quantifying and Mapping Crop Evapotranspiration in the Mesilla Valley by Remote Sensing, Ground Measurements, Modeling, and Crop Classification*.
   - **ADVISOR**: Salim Bawazir, Ph.D.
   - **MINOR**: Geographic Information Systems (GIS).
2. **MSC (WITH HONORS)**, Civil Engineering - Water Resources, May 2012
   - **THESIS ENTITLED:** *Remote Sensing Estimates of NDVI, Albedo, and LST Using Duncan Tech Multispectral and Flir® Thermal Imagers: A Vicarious Calibration to Landsat-7 Measurements*.
   - **ADVISOR**: Salim Bawazir, Ph.D.

JORDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (JUST), Irbid, JORDAN.

1. **BSC (WITH GOOD RATING)**, Agricultural Engineering and Technology, June 2003.

ACADEMIC CAREER

- **ASSISTANT PROFESSOR & DEPARTMENT HEAD**, Department of Civil Engineering, Ajloun National University, JORDAN October 2025 – present
- **ADJUNCT FACULTY**, College of Integrative Studies, Abdullah Al-Salem University, KUWAIT Sept. 2024 – June 2025
- **TEACHING ASSISTANT**, Department of Civil Engineering, NMSU, USA Jan. 2019 - May 2024
- **TEACHING ASSISTANT**, Department of Civil Engineering, NMSU, USA August 2010 - May 2012
- **TEACHING ASSISTANT**, Department of Agricultural Engineering and Technology, JUST, JORDAN Oct. 2004 - June 2005

RESEARCH INTERESTS

Water Resources Management and Spatiotemporal Analysis, with a focus on:

1. **Satellite Remote Sensing for Climate and Environmental Monitoring**: Using multi-source satellite datasets such as Landsat, ASTER, and Sentinel to effectively monitor and model various environmental variables, including evapotranspiration, land surface temperature, vegetation health, and soil moisture. Utilizing remote sensing models and GIS to quantify and map evapotranspiration and analyze its impacts on human and natural systems, such as land use/land cover and water management.
2. **Geospatial Analysis for estimate and mapping Agronomic Parameters**: Photogrammetry and geospatial analysis play a critical role in the spatial mapping of agronomic parameters, enabling precise monitoring and modeling of vegetation dynamics under varying environmental conditions. Multispectral and hyperspectral imagery from satellite and aerial sources is used to extract and estimate critical canopy parameters, including albedo, land surface temperature (LST), leaf area index (LAI), normalized difference vegetation index (NDVI), and fractional vegetation cover (FVC). These parameters are crucial for understanding the response of vegetation to climate stress, land management practices, and hydrological conditions.
3. **Data-Driven Climate and Water Modeling**: Employing spatial data science techniques, machine learning, and time-series satellite imagery to predict environmental responses to climatic drivers. Emphasis on evapotranspiration modeling, water balance components, and their implications for agricultural and ecological systems.
4. **Open-Source Tools and Programming in Geospatial Research**: Use of open-source geospatial tools (e.g., OPENET platform, EarthExplorer, NASA LP DAAC / Earthdata, QGIS, Google Earth Engine, NAIP, CropScape - CDL, Web Soil Survey, SRTM DEM, ASTER Global DEM, and GCN250 Global Curve Numbers) and programming languages (GitHub Python Code) for advanced spatial analysis and environmental modeling applications.
5. **Time Series and Statistical Analysis**: Focused on evaluating temporal trends in reference evapotranspiration (ETo), actual evapotranspiration (ETa), and crop coefficients (Kc) using remote sensing and meteorological data. Apply statistical techniques such as regression analysis, central tendency measures (mean, median), weighted averages, and error metrics including Mean Bias Error (MBE) and Root Mean Square Error (RMSE) to assess model performance, identify biases, and improve estimation accuracy.

RESEARCH EXPERIENCE

- **RESEARCH ASSISTANT**, Re-Inventing the Nation's Urban Water Infrastructure (ReNUWIt), Stanford University, USA Jan. 2019 - May 2020
  - Conducted research on the effects of urbanization on surrounding climate and water demand using remote sensing.
  - Mentored undergraduate students in the Stanford ReNUWIt Research Experience for Undergraduates (REU) program during an eight-week summer session.

- **RESEARCH ASSISTANT**, Water Resources Research Institute (WRRI) - Secure Water Future (SWF), USA
  Jan. 2020 - present
  - Evaluated the accuracy of remote sensing-based evapotranspiration (ET) models from OpenET by comparing them with eddy covariance measurements to identify the most reliable model for pecan orchards in the Mesilla Valley.
  - Generated spatiotemporal ET maps using METRIC and SSEBop models by selecting representative crop pixels and validating results against ground-based eddy covariance data.
  - Contributed to bi-monthly team meetings and co-authored annual reports to support project alignment, progress tracking, and dissemination of outcomes.

- **LAB ASSISTANT**, Waste Water Treatment, Water Authority, JORDAN March 2005 - March 2006

- **RESEARCHER**, Population, Housing, and Agriculture Survey, Department of Statistics, JORDAN
  Nov. 2006 - May 2007

PUBLICATIONS

(2025)

1. **Z.M. TAWALBEH,** , A.S. Bawazir. Using remote sensing techniques to assess the impact of urban development on land surface temperature at Sunland Park City, NM. Manuscript in preparation.

2. **Z.M. TAWALBEH,** , A.S. Bawazir, A. Fernald, R. Sabie. Analysis of Remotely Sensed METRIC Model for Assessing and Mapping Regional Evapotranspiration of Three Major Crops in the Mesilla Valley, New Mexico. Manuscript in preparation.

(2024)

3. **Z.M. TAWALBEH,** , A.S. Bawazir, A. Fernald, R. Sabie, R.J. Heerema. Assessing Satellite-Derived OpenET Platform Evapotranspiration of Mature Pecan Orchard in the Mesilla Valley, New Mexico. *Remote Sensing* **16** (8): 1429 (2024).

4. **Z.M. TAWALBEH,** , A.S. Bawazir, A. Fernald, R. Sabie. Spatiotemporal Variabilities in Evapotranspiration of Alfalfa: A Case Study Using Remote Sensing METRIC and SSEBop Models and Eddy Covariance. *Remote Sensing* **16** (13): 2290 (2024).

PRESENTATIONS

- **Pecan ET Estimates Using OPENET Platform in the Mesilla Valley, NM**
  American Water Resources Association (AWRA), AWRA 2023 Summer Conference. DENVER, CO.
  July 17, 2023.

- **Comparison of Mature Pecan Orchard OPEN-ET Estimates with Ground-Measured Values**
  Secure Water Future (SWF), Virtual SWF Summer Research Presentations. June 9, 2023.

- **Spatiotemporal Variability of Alfalfa ET Under Farming Practices in the Mesilla Valley**
  Graduate Research and Arts Symposium (GRAS), NMSU. LAS CRUCES, NM. Nov. 10, 2023.

- **Assessing Remotely Sensed Data Derived OPEN-ET Models for Operational Irrigation Management of Mature Pecan Orchard in the New Mexico Mesilla Valley**
  NM Water Resources Research Institute (NM WRRI), 67th Annual NM Water Conference. LAS CRUCES, NM. October 26, 2022.

- **Using Remote Sensing to Develop ET Fluxes for the Mesilla Valley Aquifer**

  American Society of Agricultural and Biological Engineers (ASABE) meeting, Cotton Ginning Research Lab. LAS CRUCES, NM. October 21, 2022.

- **Spatiotemporal Variability of Alfalfa ET Under Farming Practices in the Mesilla Valley**

  Re-inventing the Nation's Urban Water Infrastructure (ReNUWIt) annual meeting, Stanford University. SAN JOSE, CA. May 22, 2022.

- **Spatiotemporal Variabilities in Evapotranspiration of Alfalfa: A Case Study Using Remote Sensing METRIC and SSEBop Models and Eddy Covariance**

  18th Annual RMSAWWA/RMWEA Student Conference hosted by University of New Mexico (UNM) RMSAWWA/RMWEA Student Chapter. ALBUQUERQUE, NM. May 16, 2022.

- **Assessing the Impact of Urban Development in Land Surface Temperature at Sunland Park City, Nm Using Remote Sensing Techniques**

  Re-inventing the Nation's Urban Water Infrastructure (ReNUWIt) annual meeting, Stanford University. SAN JOSE, CA. July 7, 2020.

- **The Current and Future of Groundwater Resources of Jordan**

  Graduate Seminar, NMSU. LAS CRUCES, NM. October, 2019.

TEACHING INTERESTS

With my academic background in civil and water resources engineering and specialized expertise in hydrology, hydraulics, and geospatial technologies, I am well-prepared to teach a broad range of undergraduate and graduate courses. These include fundamental civil engineering subjects such as Introduction to Civil Engineering, Statics for Civil Engineers, Strength of Materials, and Fluid Mechanics, as well as advanced topics like Hydraulic Engineering, Hydrology and Water Resources, Surface Water Hydrology, Open Channel Flow, Hydrodynamics, Piping Systems, and Design of Dams. My experience in remote sensing and GIS also enables me to teach GIS for Environment and Water Resources, Remote Sensing Applications, Geospatial Data Analysis and Modelling, Geospatial Programming (MATLAB), Hydrological and Watershed Delineation, and Statistical and Data Analysis.

TEACHING EXPERIENCE

- **ADJUNCT PROFESSOR**, College of Integrative Studies, ABDULLAH AL SALEM UNI. (AASU), KUWAIT

  September 2024 – June 2025

  – Taught Intermediate Algebra (IMP 098) and PreCalculus (IMP 099).

- **TEACHING ASSISTANT**, Department of Civil Engineering, NMSU, USA

  January 2019 – May 2024

  – Taught Fluid Mechanics and Hydraulics Lab.

- **TEACHING ASSISTANT**, Department of Civil Engineering, NMSU, USA

  August 2010 – May 2012

  – TA for Introduction to Civil Engineering (CE 151)
  – TA for Geohydrology (G EN/ES 452)
  – TA for Surface Water Hydrology (CE 483)
  – TA for Design of Water Wells/Pumping System (A EN 459).

- **TEACHING ASSISTANT**, Department of Agricultural Engineering and Technology, JUST, JORDAN

  Oct. 2004 - June 2005

- TA for Fluid Mechanics
- TA for Fluid Mechanics and Hydraulics Lab
- TA for Engineering Drawing.

REMOTE SENSING AND TECHNICAL EXPERIENCE

- **Satellite Imagery Pre-Processing and Analysis:**
  - Landsat-5, 7, 8, and 9 Satellite imagery - NASA and the U.S. Geological Survey (USGS)
  - Sentinel-2 optical imagery- Copernicus Program
  - USGS - Aerial Photography - National Agriculture Imagery Program (NAIP)
  - The Soil Moisture Active Passive (SMAP) "Surface Soil Moisture 9 km"
  - Web Soil Survey (WSS) - United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)
  - USDA-NRCS-Crop Data layer (CDL) classification maps
  - ASTER Global Digital Elevation Model V003
  - The Shuttle Radar Topography Mission (SRTM) - Digital Elevation Models (DEMs).
- **Agronomic Parameters and Vegetation Indices:**
  - Normalized Difference Vegetation Index (NDVI)
  - Soil-Adjusted Vegetation Index (SAVI)
  - Leaf Area Index (LAI)
  - Enhanced Vegetation Index (EVI)
  - Albedo
  - Water-use efficiency (WUE)
  - Land surface temperature (LST)
  - Evapotranspiration (ET).
- **Remote Sensing Models:**
  - Mapping EvapoTranspiration at high Resolution with Internalized Calibration (METRIC)
  - Surface Energy Balance Algorithm for Land (SEBAL)
  - Operational Simplified Surface Energy Balance (SSEBop)
  - Satellite Irrigation Management Support (SIMS).

FIELD & LAB MEASUREMENT EXPERIENCE:

- **Lab Measurement Data:**
  - Measured of soil moisture content using the HS2 HydroSense II or CS655
  - Measured the matric potential of the soil using the PotentiaMeter (WP4C)
  - Measured the capillarity of water
  - Measured viscosity using the rotating viscometer device
- **Field Measurement Data:**
  - Field measurements of open channel flow using the USGS type AA current flowmeter device
  - Field measurements of Air Temperature, Relative Humidity, and Solar radiation
  - Field and laboratory measurements of pressure using the gages and pressure transducer devices

NUERAL NETWORK EXPERIENCE:

- **MATLAB software:**
  - Utilized Neural network fitting and deep learning techniques in MATLAB to predict missing climate data and estimate Penman-Monteith evapotranspiration (ETo) and crop coefficients (Kc).

US AGENCIES SUPPORTED AND FUNDED:

My doctoral research was supported and funded by the following U.S. agencies and organizations:

- Agriculture and Food Research Initiative from USDA
- National Institute of Food and Agriculture (NIFA) from USDA
- Secure Water Future (SWF) team
- NM Water Resources Research Institute (NMWRRI)
- U.S. Geological Survey (USGS)
- Elephant Butte Irrigation District (EBID).

JOURNAL REVIEWER

- **Agricultural Water Management, Elsevier, ISSN 0378-3774**.

AWARDS AND HONOURS

- **TERMINAL DEGREE SUCCESS TUITION INCENTIVE AWARD**, NMSU, USA Fall 2022 - Spring 2023..
- **GA UNION CONTRACT SCH AWARD, NMSU**, USA Fall 2023 - Spring 2024.
- **TRAVEL AWARD, NMSU**, USA July 2023.
- **GRADUATE TUITION FELLOWSHIP**, NMSU, USA Spring 2019 - Fall 2022.
- **TRAVEL AWARD, NMSU**, USA May 2022.
- **MSC GRADUATION WITH HONORS**, NMSU, USA May 2012.

COMPUTER SKILLS

- Environment for Visualizing Images (ENVI5.3®) computer program
- Geographic Information System (ArcGIS)
- Watershed Modeling System (WMS)
- Hec-HMS software for hydrology and watershed delineation
- MATLAB mathematical and computer program
- Microsoft computer skills (Excel, Word, and PowerPoint).