

# MAHMOUD AHMAD

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## RESEARCH PROFILE – HYDROLOGY & CLIMATE SYSTEMS

Hydrology-focused PhD candidate at Széchenyi István University and civil engineer specializing in hydroclimatic systems, rainfall–groundwater interactions, and applied water-resources modelling. Experienced in hydrological time-series analysis, statistical modelling, and numerical simulation of groundwater and precipitation-driven processes for environmental applications. Skilled in integrating GIS-based spatial analysis with data-driven workflows, with a strong focus on understanding rainfall variability, hydrological responses across temporal scales, and model-based interpretation of climate-related water dynamics. Demonstrates strong quantitative reasoning, structured data management, and the ability to translate complex hydrological processes into modelling frameworks supporting climate-adaptive water management. Experienced in interdisciplinary academic environments, including teaching and supervision of practical hydrology-related activities. Fluent in professional English; German A2 and Hungarian A2 (both actively improving).

## KEY COMPETENCIES IN HYDROLOGY & CLIMATE ANALYSIS

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| <ul style="list-style-type: none"><li>• Hydroclimatic system analysis and rainfall variability assessment across temporal scales</li><li>• Hydrological time-series analysis, statistical modelling, validation, and QA/QC procedures</li><li>• Groundwater–surface water interactions and process-based hydrological interpretation</li><li>• Numerical modelling workflows for water systems (MODFLOW/GMS-based approaches)</li><li>• GIS-based spatial analysis and hydro-environmental mapping (ArcGIS)</li></ul> | <ul style="list-style-type: none"><li>• Integration of multi-source data (rainfall, groundwater, climate) for modelling and interpretation</li><li>• Data organization, reproducibility, and quality-controlled analytical workflows</li><li>• Technical reporting and structured environmental documentation</li><li>• Interdisciplinary collaboration in hydrology, climate, and environmental systems</li><li>• Analytical problem-solving and decision-support oriented modelling</li></ul> |
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## TECHNICAL & MODELLING SKILLS

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| <ul style="list-style-type: none"><li>• Hydrological &amp; Environmental Modelling: GMS, MODFLOW-based modelling, HEC-RAS, WEAP; conceptual and numerical modelling of groundwater and hydrological systems</li><li>• Hydroclimatic Data Analysis: time-series analysis, statistical modelling, QA/QC procedures, and validation of rainfall and groundwater datasets</li><li>• Programming &amp; Scientific Computing: Python (data analysis, modelling workflows), MATLAB, SPSS</li><li>• Engineering Software (supporting tools): AutoCAD, ETABS, SAFE, SAP2000, Revit (basic level)</li></ul> | <ul style="list-style-type: none"><li>• GIS &amp; Spatial Analysis: ArcGIS, AutoCAD Map, Civil 3D; spatial data processing and hydro-environmental mapping</li><li>• Data Management &amp; Reproducibility: structured data workflows, environmental data handling, and reproducible analytical pipelines</li><li>• Technical Reporting: scientific documentation, reporting, and interpretation of modelling results</li></ul> |
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## PROFESSIONAL EXPERIENCE

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**Lecturer (Practical Sections) – Hydrology & Hydraulics** | Department of Transport Infrastructure and Water Resources Engineering | Faculty of Civil Engineering, Széchenyi István University | Győr, Hungary  
Sep 2024 – Present

- Delivered practical training in hydrology and hydraulics with emphasis on hydroclimatic processes, measurement techniques, and interpretation of rainfall–runoff and water-system dynamics.
- Supported student learning hydrological analysis, including time-series interpretation and process-based understanding of water systems under variable climatic conditions.
- Contributed to structured teaching of hydrological processes, linking theoretical concepts to real-world environmental and engineering applications.
- Guided students in data handling, validation (QA/QC), and reproducible analysis workflows within an international academic environment.

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### **Civil Engineer – Site Manager | Emirates Red Crescent & National Companies (GCBC) | Lattakia, Syria**

**Mar 2023 – May 2024**

- Supervised infrastructure execution for post-earthquake housing projects, ensuring compliance with technical specifications, quality standards, and safety requirements.
- Managed structured technical documentation, progress monitoring, and reporting to support data-informed decision-making under time constraints.
- Coordinated multidisciplinary teams and maintained organized project datasets in high-pressure operational environments.
- Developed strong problem-solving and organizational skills applicable to complex environmental and engineering systems.

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### **Lecturer (Practical Sections) – Hydrology & Hydrogeology | Department of Water and Irrigation, Faculty of Civil Engineering, Tishreen University | Latakia, Syria**

**Jul 2019 – Sep 2023**

- Delivered practical training in hydrology and hydrogeology, focusing on groundwater–surface water interactions and hydrological process interpretation
- Supervised applied water-resources projects involving hydrological observations, time-series data analysis, and QA/QC validation of environmental datasets.
- Supported technical reporting and documentation aligned with engineering and environmental standards.
- Contributed to the development of structured practical frameworks emphasizing data consistency, reproducibility, and analytical rigor.

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## **EDUCATION**

### **• PhD in Civil Engineering (Water Management Resources)**

Széchenyi István University, Győr, Hungary | Sep 2024 – Present

Research focus: • Research focus: groundwater modelling, hydroclimatic system dynamics, and data-driven analysis of water systems under variable environmental conditions.

- Current work includes analysis of rainfall–groundwater interactions, time-series modelling, and development of predictive and physically-based frameworks.

### **• MSc in Water and Irrigation Engineering (Water Management Resources)**

Tishreen University, Latakia, Syria | Jul 2019 – Nov 2023

Thesis: *The Relationship between Unconfined Groundwater and Streamflow of Al-Hsain River in the Coastal Plain.*

Focus: groundwater–surface water interactions, hydrological analysis, and system response to climatic forcing.

Final Grade: 87.1%

### **• BSc in Civil Engineering**

Tishreen University, Latakia, Syria | Sep 2013 – Aug 2018

Thesis: *Groundwater Movement Modelling Using GIS and GMS.*

Focus: numerical modelling of groundwater systems and GIS-based hydrogeological analysis.  
Final Grade: 83.69%

- **High School Diploma (Scientific Section)**  
Tartous, Syria | 2012 – 2013  
Final Grade: 90.21%

**SELECTED PUBLICATION (PEER-REVIEWED)**

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- Ahmad, M., Bene, K., & Ray, R. (2026). *Fuzzy modeling strategies for groundwater level forecasting: Comparing local, integrated, and behavioral frameworks for a data-limited coastal aquifer in the Eastern Mediterranean*. *Water*, 18(5), 566. <https://doi.org/10.3390/w18050566>  
→ Developed and evaluated multiple modelling strategies for groundwater prediction under hydroclimatic variability conditions.
- Ahmad, M., Bene, K., & Ray, R. (2026). *Rainfall–groundwater correlations using statistical and spectral analyses: A case study from the coastal plain of Al-Hsain Basin, Syria*. *Hydrology*, 13(1), 25. <https://doi.org/10.3390/hydrology13010025>  
→ Quantified rainfall–groundwater interactions using time-series, spectral, and coherence-based analytical methods.
- Ahmad, M., & Bene, K. (2025). *MODFLOW-based simulation of groundwater response to rainfall in the coastal plain of Al-Hsain Basin, Syria*. *Chemical Engineering Transactions*, 121, 25–30. <https://doi.org/10.3303/CET25121005>  
→ Applied physically-based numerical modelling to simulate rainfall-driven groundwater dynamics.
- Ahmad, M. (2022). *Evaluating the aquifer in the coastal plain of Al-Hsain Basin*. *Tishreen University Journal (Engineering Sciences)*. <https://journal.tishreen.edu.sy/index.php/engscnc/issue/view/639>  
→ Conducted hydrogeological assessment and aquifer characterization using field and analytical methods.

**RELEVANT GROUNDWATER PROJECTS**

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- **Groundwater–Surface Water Interaction Analysis (MSc Research)**  
Investigated the dynamic interaction between unconfined groundwater and streamflow in the Al-Hsain River coastal plain under variable hydroclimatic conditions. Applied time-series analysis and data-driven methods to quantify system response to rainfall variability and seasonal forcing. Results supported conceptual understanding of recharge mechanisms and groundwater–surface water exchange processes.
- **Groundwater Flow Modelling using GIS and GMS (BSc Research)**  
Developed a GIS- and GMS-based numerical modelling framework to simulate groundwater flow dynamics and assess system behaviour under different boundary and stress conditions. Evaluated groundwater response to recharge variability and operational scenarios, including preliminary assessment of seawater intrusion risks in a coastal aquifer system.

**HONORS AND LANGUAGES**

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| • Certificate for Distinguished Academic Achievement (Ranked 1st, 3rd Year, Grade: 88.64%) Tishreen University, Syria | • Arabic: Native                                  |
| • Certificate for Distinguished Academic Achievement (Ranked 1st, 4th Year, Grade: 89.5%) Tishreen University, Syria  | • English: C1 (Professional Academic Proficiency) |
| • Hungarian: A2 (Basic – actively improving)                                                                          | • German: A2 (Basic – actively improving)         |